COLUMBIA

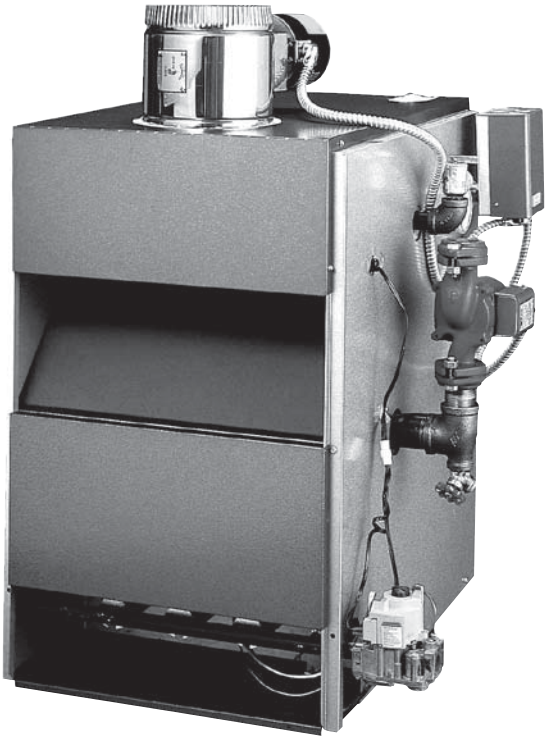
MODEL NUMBERS:

MCB50	MCB75	MCB100
MCB125	MCB150	MCB175
MCB200	MCB250	MCB300

MCB SERIES

Cast Iron Gas Fired Boilers For Forced Hot Water

INSTALLATION, OPERATION & MAINTANANCE MANUAL



COLUMBIA BOILER COMPANY

Main offices and Factory: Pottstown, PA

P/N 37612101, Rev. B [02/09]

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KEEP THIS MANUAL NEAR BOILER
RETAIN FOR FUTURE REFERENCE

SAFETY SYMBOLS & WARNINGS

The following defined symbols are used throughout this manual to notify the reader of potential hazards of varying risk levels.

⚠ DANGER

Indicates an *imminently* hazardous situation Which, if not avoided, *will* result in death, serious injury or substantial property damage.

⚠ WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death, serious injury or substantial property damage.

⚠ CAUTION

Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury or property damage.

IMPORTANT: Read the following instructions COMPLETELY before installing!!

⚠ WARNING

1. Keep boiler area clear and free from combustible materials, gasoline and other flammable vapors and liquids.

2. DO NOT obstruct air openings to the boiler room.

3. Modification, substitution or elimination of factory equipped, supplied or specified components may result in property damage, personal injury or the loss of life.

4. TO THE OWNER - Installation and service of this boiler must be performed by a qualified installer.

5. TO THE INSTALLER - Leave all instructions with the boiler for future reference.

6. When this product is installed in the Commonwealth of Massachusetts the installation must be performed by a Licensed Plumber or Licensed Gas Fitter.

⚠ WARNING

All installations of boilers and venting should be done only by a qualified expert and in accordance with the appropriate manual. Installing or venting a boiler or any other gas appliance with improper methods or materials may result in serious injury or death due to fire or to asphyxiation from poisonous gases such as carbon monoxide which is odorless and invisible.

C.S.A. Certified
For Natural Gas Or Propane

Tested For 100 LBS.
ASME
Working Pressure

RATINGS & DATA - NATURAL GAS & PROPANE GAS

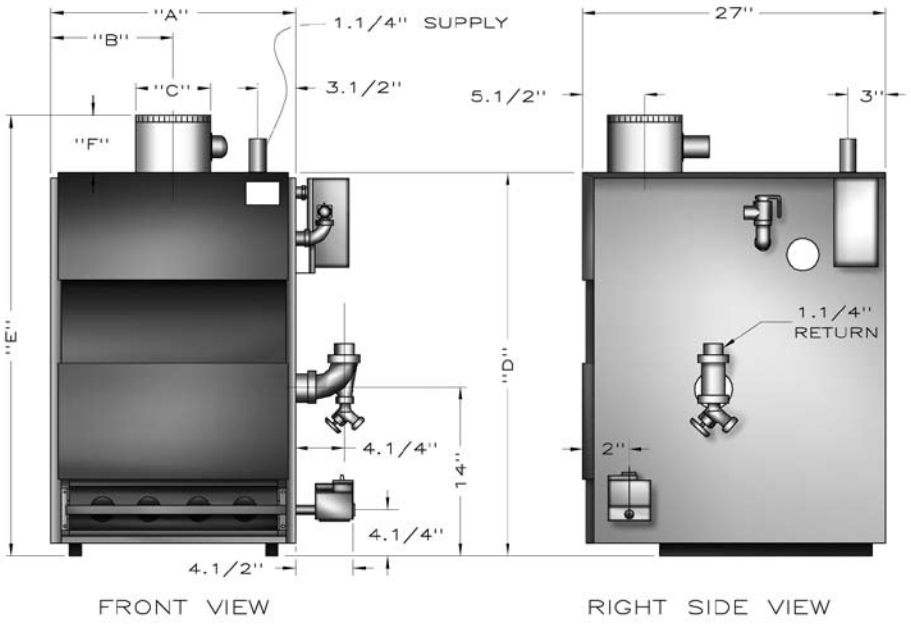
Boiler No.	(1) A.G.A. Input Btu/Hr.	(1) Heating Capacity Btu/Hr.	(1) ** I=B=R NetOutput Btu/Hr	(2) NetRating Sq. Ft. HW @ 170°	No. of Burners	(3) Recommended Air Cushion Tank	Water Content (Gals.)
50	50,000	42,000	37,000	243	1	15	2.4
75	75,000	63,000	55,000	365	2	15	4.0
100	100,000	83,000	72,000	481	2	30	4.0
125	125,000	104,000	90,000	603	3	30	5.6
150	150,000	124,000	108,000	719	3	30	5.6
175	175,000	143,000	124,000	829	4	30	7.2
200	200,000	165,000	143,000	957	4	30	7.2
250	250,000	205,000	178,000	1189	5	30	8.8
300	299,999	243,000	214,000	1368	6	60	10.4

EXPLANATORY NOTES

--All boilers are design certified for installation on noncombustible floor.
--For installation on combustible floors use combustible floor kit.
--Recommended chimney height 20 feet. In special cases where conditions permit, chimney height may be reduced to 10 feet. Refer to the latest revision of NFGC part 11.
--Electric service to be 120 Volts, 15 Amps, 60 Hz.
--The MEA number for the this boiler is 19-79-E.
(1) For elevations above 2000 feet, ratings should be reduced at a rate of 4% for each 1000 feet above sea level.
(2) Base on 170° temperature in radiators.
(3) Tank sized for non-ferrous baseboard or radiant panel systems. Increase size for cast iron baseboard and radiation.
--Net I=B=R ratings include 15% allowance for normal piping and pick-up load. Manufacturer should be consulted on installations having other than normal piping and pick-up requirements.
** For equivalent square feet of radiation, divide I=B=R output by 150.

STANDARD EQUIPMENT: Boiler Jacket, Cast Iron Boiler Battery, High Limit Control, Vent Damper Relay, Theraltimeter Gauge, Circulator With Return Piping To Boiler, Main Gas Burners, Combination 24 Volt Gas Control (Includes Automatic Gas Valve, Gas Pressure Regulator, Automatic Pilot, Safety Shutoff, Pilot Flow Adjustment, Pilot Filter), A.S.M.E. Relief Valve, Drain Cock, Spill Switch, Rollout Switch, Automatic Vent Damper. Not Shown Are: Wiring Harness, Thermocouple, Non-linting Safety Pilot.

OPTIONAL EQUIPMENT: Intermittent Electric Ignition Pilot System.



Boiler No.	Natural Gas Inlet*	Dimensions						Pump size Supply & Return Tappings
		A	B	C	D	E	F	
50	½"	11⅛"	5½"	4"	30¾"	36¼"	6"	1¼"
75	½"	15	7½"	5"	30¾"	37¾"	6"	1¼"
100	½"	15	7½"	6"	30¾"	37¼"	6½"	1¼"
125	½"	18⅞"	9½"	6"	30¾"	37¼"	6½"	1¼"
150	½"	18⅞"	9½"	7"	30¾"	37¾"	7"	1¼"
175	½"	22¾"	11½"	7"	30¾"	38¾"	7"	1¼"
200	½"	22¾"	11½"	8"	30¾"	38¾"	8"	1¼"
250	¾"	265 13/16"	13¼"	8"	30¾"	40¾"	8"	1¼"
300	¾"	30½"	15¼"	9"	30¾"	42¾"	10"	1¼"

** Propane gas inlet, all units, 1/2"*

⚠ WARNING

Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage.

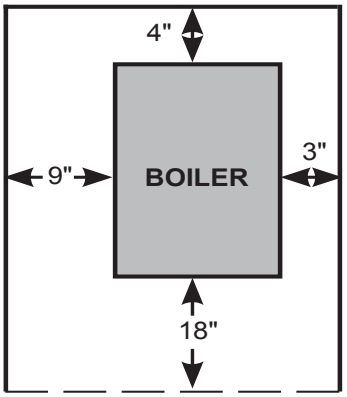
1. The installation must conform to the requirements of the authority having jurisdiction or, in the absence of such requirements, to the latest revision of the National Fuel Gas Code, ANSI Z223. (Available from the American Gas Association, 8501 E. Pleasant Valley Road, Cleveland, Ohio 44134). Reference should also be made to local gas utility regulations and other codes in effect in the area in which the installation is to be made. When installed in Canada: The latest revision of the CAN1-B149.1 and/or B149.2 Installation Codes for Gas-Burning Equipment and/or local codes.
2. Where required by the authority having jurisdiction, the installation must conform to American Society of Mechanical Engineers Safety Code for Controls and Safety Devices For Automatically Fired Boilers, ANSI/ASME No.CSD-1.
3. This boiler series is classified as a Category 1 and the vent installation shall be in accordance with Part 7 of the National Fuel Gas Code noted above when installed in the United States. In Canada refer to the CAN1-B149.1 and or B149.2 Installation Codes for Gas-Burning Equipment. Also refer to applicable provisions of the local building codes.
4. This boiler has met safe lighting and other performance criteria with the gas manifold and control assembly on the boiler per the latest revision of ANSI Z21.13/CGA 4.9.
5. The boiler shall be installed such that the gas ignition system components are protected from water (dripping, spraying, rain, etc.) during appliance operation and service, (circulator replacement, condensate trap, control replacement, etc.).
6. Locate boiler on level, solid base as near the chimney as possible and centrally located with respect to the heat distribution system as practical.
7. Allow 24 inches at the front and right side for servicing and cleaning.
8. When installed in a utility room, the door should be wide enough to allow the largest boiler part to enter, or to permit replacement of another appliance such as a water heater.
9. FOR INSTALLATION ON NON-COMBUSTIBLE FLOORS ONLY - For installation on combustible flooring special base must be used. (See Replacement Parts Section.) The boiler can not be installed on carpeting. Minimum clearances to combustible construction are:

TOP	18 IN.
FRONT	ALCOVE *
FLUE CONNECTOR	6 IN.
REAR	4 IN.
CONTROL SIDE	9 IN.
OTHER SIDE	3 IN.

NOTE: Greater clearances for access should supersede fire protection clearances.

* The definition of an Alcove is a three sided space with no wall in front of the boiler. The ANSI standard for an alcove is 18 inches from the front of an appliance to the leading edge of the side walls as shown below.

Minimum Clearances to Combustible Construction *(as seen from above)*



⚠ WARNING

Air openings to combustion area must not be obstructed. By following the instructions below, adequate combustion air can be maintained.

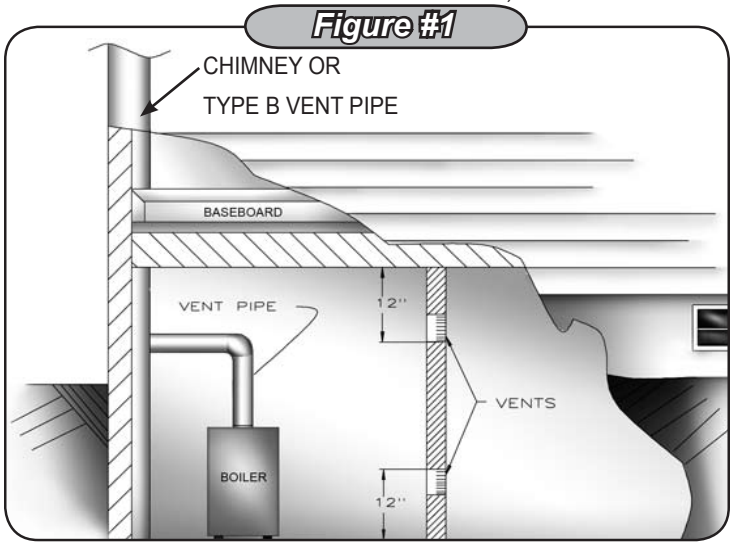
COMBUSTION AIR REQUIREMENTS
(Minimum Square Inches Requirement)

Model No.	Unconfined Area*		Confined Area**	
	Inside Combustion Air	Outside Combustion Air	Outside Combustion Air	
	1 Sq. In./1000 Btu/Hr. *(Fig. #3)*	1 Sq. In./5000 Btu/Hr. *(Fig. #4)*	Vertical Ducts 1 Sq. In./4000 BTU/Hr.	Horizontal Ducts 1 Sq. In./2000 BTU/Hr.
50	100	10	13	25
75	100	15	19	38
100	100	20	25	50
125	125	25	32	63
150	150	30	38	75
175	175	35	44	88
200	200	40	50	100
250	250	50	63	125
300	300	60	75	150

* A space whose volume is not less than 50 cubic feet per 1000 BTU per hour of all appliances installed in that space (cubic feet of space = height x width x length)
** A space whose volume is less than 50 cubic feet per 1000 BTU per hour of all appliances installed in that space (cubic feet of space = height x width x length)

1. Ventilation of the boiler room must be adequate to provide sufficient air to properly support combustion per the latest revision of the National Fuel Gas Code, ANSI Z223.1.

Figure #1



2. When a boiler is located in an unconfined space in a building or conventional construction frame, masonry or metal building, infiltration normally is adequate to provide air for combustion and ventilation. However, if the equipment is located in a building of tight construction (See the National Fuel Gas Code, ANSI Z223.1 latest revision), the boiler area should be considered as a confined space. In this case air for combustion and ventilation shall be provided according to Step 5. If there is any doubt, install air supply provisions in accordance with the latest revision of the National Fuel Gas Code.

3. When a boiler is installed in an unconfined space in a building of tight construction, air for combustion and ventilation must be obtained from outdoors or from spaces freely communicating with the outdoors. A permanent opening or openings having a total free area of not less than 1 square inch per 5000 Btu per hour of total input rating of all appliances shall be provided. Ducts may be used to convey makeup air from the outdoors and shall have the same cross-sectional area of the openings to which they are connected.

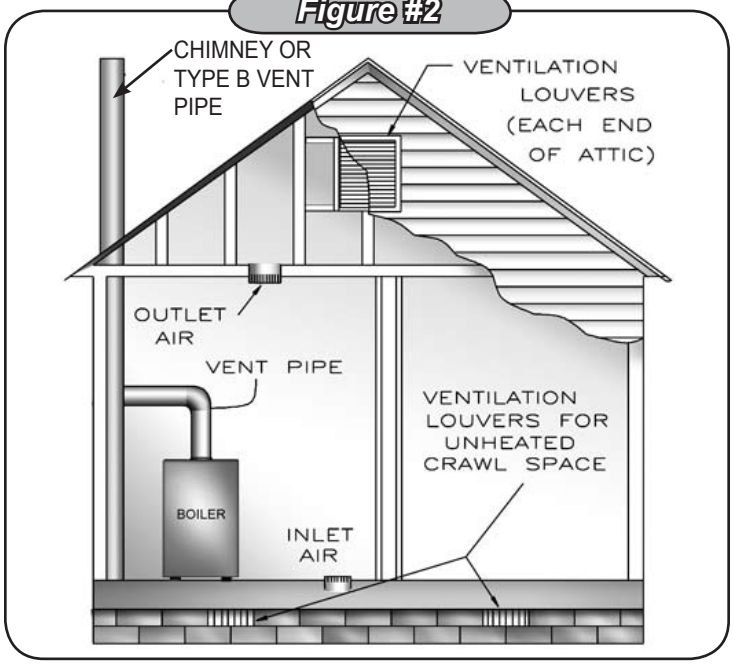
4. When air for combustion and ventilation is from inside buildings, the confined space shall be provided with two permanent openings, one starting 12 inches from the top and one 12 inches from the bottom of the enclosed space. Each opening shall have a minimum free area of 1 square inch per 1000 Btu per hour of the total input rating of all appliances in the enclosed space, but must not be less than 100 square inches. These openings must freely communicate directly with other spaces of sufficient volume so that the combined volume of all spaces meets the criteria for an unconfined space. (Figure #1)

5. When the boiler is installed in a confined space and all air is provided from the outdoors the confined space shall be provided with one or two permanent openings according to methods A or B. When ducts are used, they shall be of the same cross sectional area as the free area of the area of the openings to which they connect. The minimum dimension of rectangular air ducts shall be not less than 3 x 3 inches or 9 square inches.

A. When installing two openings, one must commence within 12 inches from the top and the other within 12 inches from the bottom of the enclosure. The openings shall communicate directly, or by ducts, with the outdoors or spaces (crawl or attic) that freely communicate with the outdoors. One of the following methods must be used to provide adequate air for ventilation and combustion.

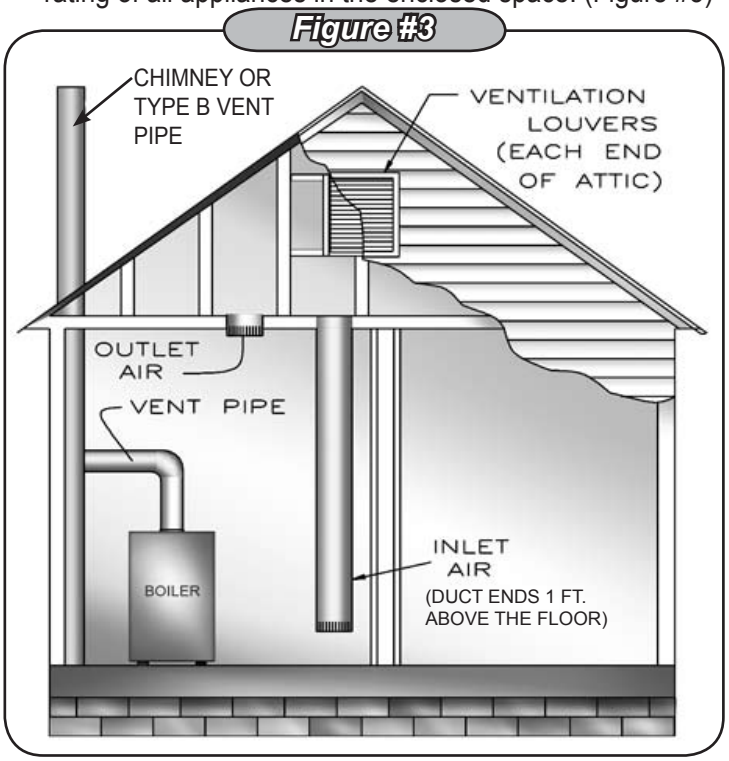
1. When directly communicating with the outdoors, each opening shall have a minimum free area of 1 square inch per 4,000 Btu per hour of total input rating of all equipment in the enclosure. (Figure #2)

Figure #2



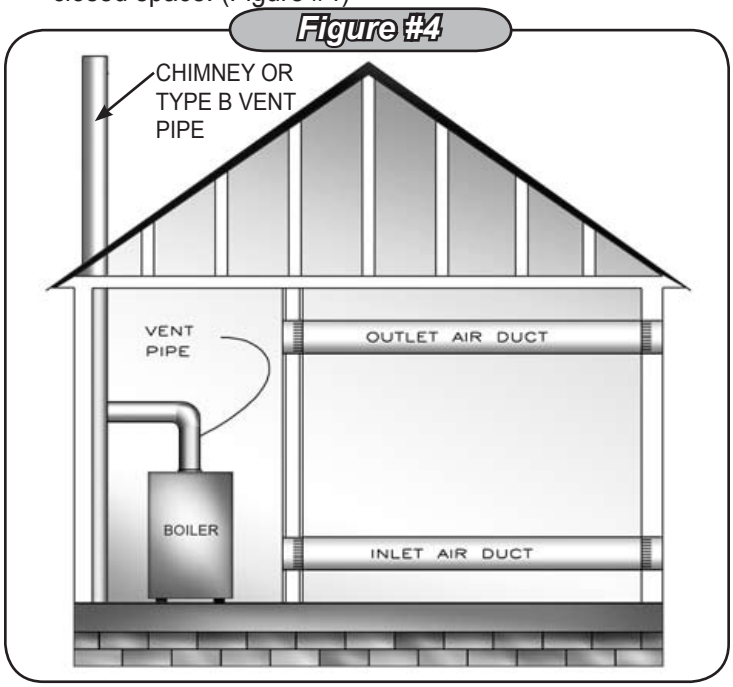
2. When communicating with the outdoors by means of vertical ducts, each opening shall have a minimum free area of 1 square inch per 4,000 Btu per hour of total input rating of all appliances in the enclosed space. (Figure #3)

Figure #3



3. If horizontal ducts are used, each opening and duct shall have a minimum free area 1 square inch per 2,000 Btu per hour of total input rating of all appliances in the enclosed space. (Figure #4)

Figure #4



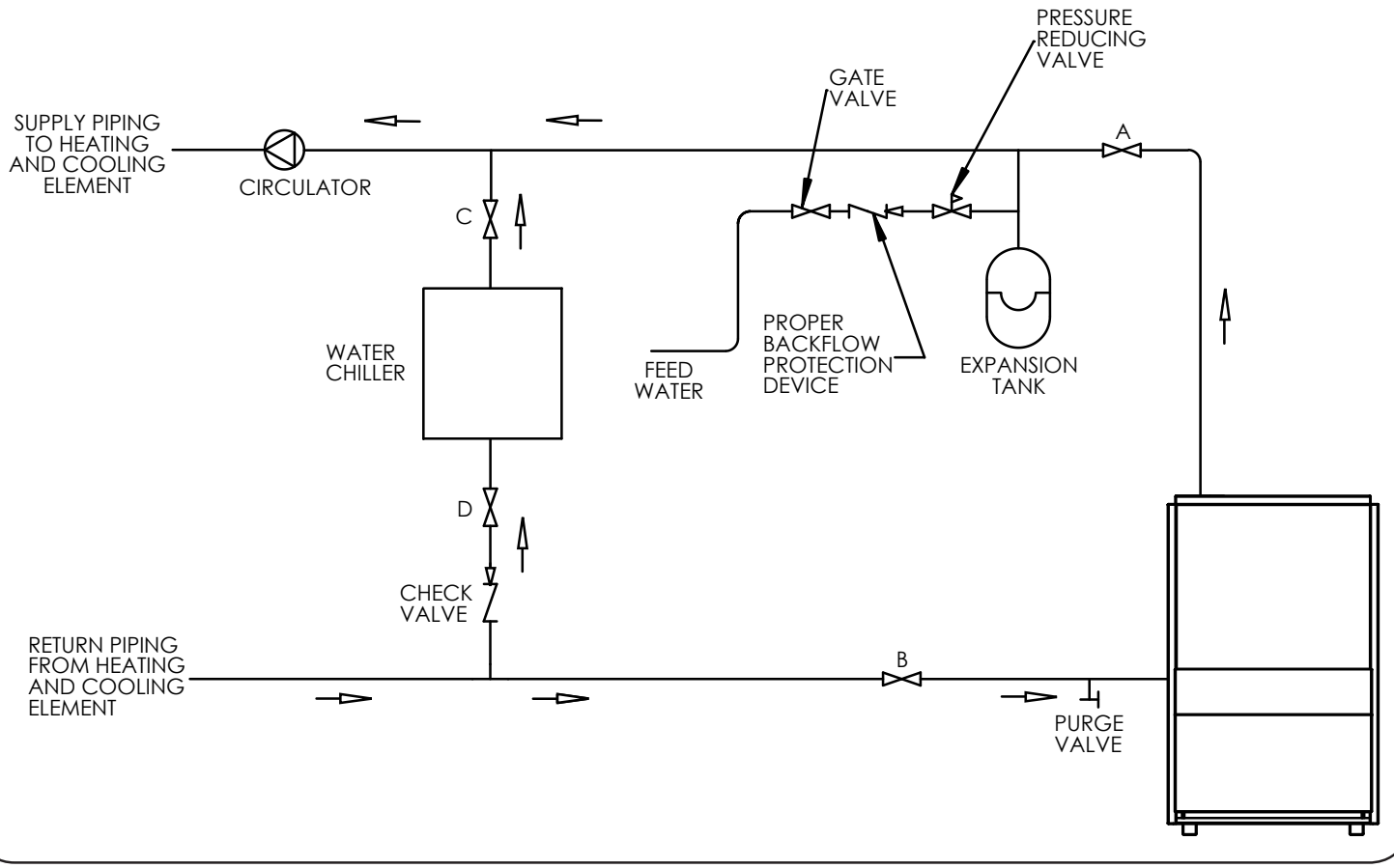
A. One permanent opening, commencing within 12 inches of the top of the enclosure, shall be permitted where the equipment has clearances of at least 1 inch from the sides, 1 inch from the back, and 6 inches from the front of the boiler. The opening shall directly communicate with the outdoors or shall communicate through a vertical or horizontal duct to the outdoors or spaces (crawl or attic) that freely communicate with the outdoors. The openings must have a minimum free area of 1 square inch per 3000 Btu per hour of the total input rating of all equipment located in the enclosure. The free area must be no less than the sum of the areas of all vent connectors in the confined space.

4. In calculating free area using louvers, grilles or screens for the above, consideration shall be given to their blocking effect. Screens used shall not be smaller than 1/4 inch mesh. If the free area through a design of louver or grill is known, it should be used in calculating the size opening required to provide the free area specified. If the design and free area is not known, it may be assumed that wood louvers will have 20-25% free area and metal louvers and grilles will have 60-75% free area. Louvers and grilles should be fixed in the open position or interlocked with the boiler so they are opened automatically during the boiler operation.

CONNECTING SUPPLY & RETURN PIPING

IMPORTANT: Circulators in the following illustrations are mounted on the system supply side, but mounting on the system return side is also acceptable practice.

Figure #5



1. Connect supply and return piping as suggested in Figure #5 when the boiler is used in connection with refrigerated systems.

A. The chilled medium MUST BE PIPED IN PARALLEL with the boiler.

B. Use appropriate valves to prevent the chilled medium from entering the heating boiler.

- During heating cycle open valves A and B, close valves C and D.

- During cooling cycle, open valves C and D, close valves A and B.

C. Maintain a minimum clearance of one inch to hot water pipes.

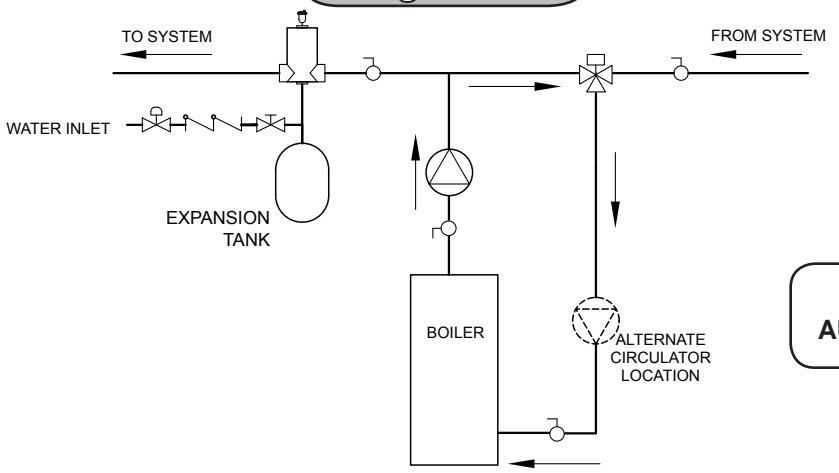
2. When the boiler is connected to heating coils located in air handling units where they may be exposed to refrigerated air circulation, the boiler piping system MUST BE supplied with flow control valves or other automatic means to prevent gravity circulation of the boiler water during the cooling cycle.

3. Hot water boilers installed above radiation level must be provided with a low water cut-off device.

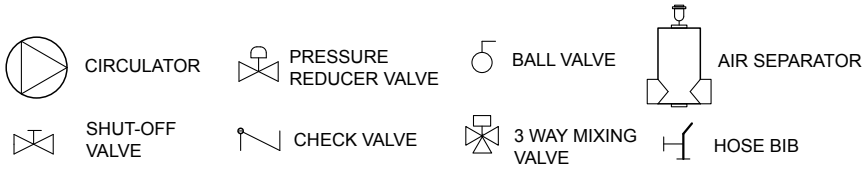
4. When a boiler is connected to a heating system that utilizes multiple zoned circulators, each circulator must be supplied with a flow control valve to prevent gravity circulation.

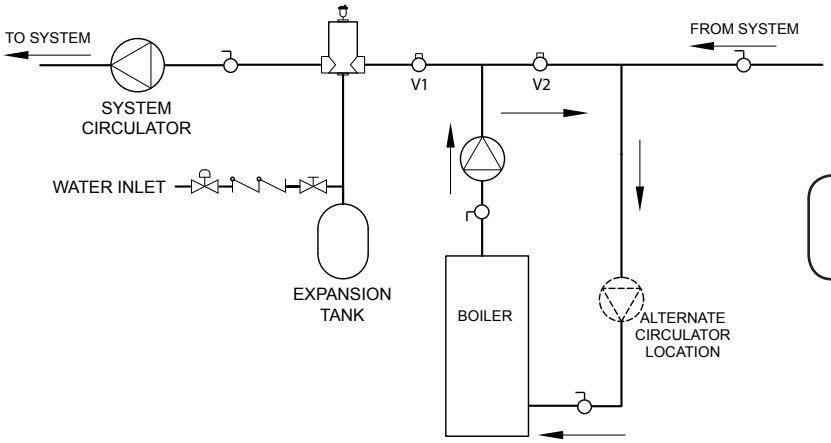
5. Hot water boilers and system must be filled with water and maintained to a minimum pressure of 12 pounds per square inch.

Figure #6

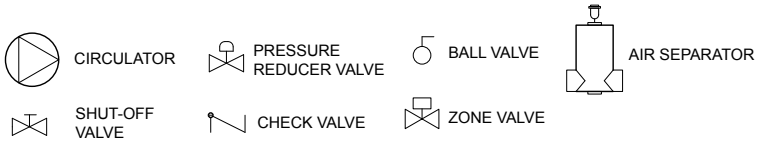


BYPASS PIPING - AUTOMATIC MIXING VALVE





BYPASS PIPING - FIXED LOW TEMP ONLY



6. Bypass piping is an option which gives the ability to adjust the supply boiler water temperature to fit the system or the condition of the installation. This method of piping, however, is not typically required for baseboard heating systems. Typical installations where bypass piping is used are as follows:

A. This method is used to protect boilers from condensation forming due to low temperature return water. Generally noticed in large converted gravity systems or other large water volume systems. *(**Figure #6**)*

B. These methods are used to protect systems using radiant panels and the material they are encased in from high temperature supply water from the boiler and protect the boiler from condensation.

NOTE#1: When using bypass piping, adjust valves V1 & V2 until desired system temperature is obtained.

NOTE#2: Bypass loop must be same size piping as the supply and return piping.

7. Installation using circulators and zone valves are shown in ***Figures #7-#10***. For further piping information refer to the I=B=R Installation and Piping Guide.

Figure #7

SINGLE ZONE SYSTEM WITH DHW PRIORITY

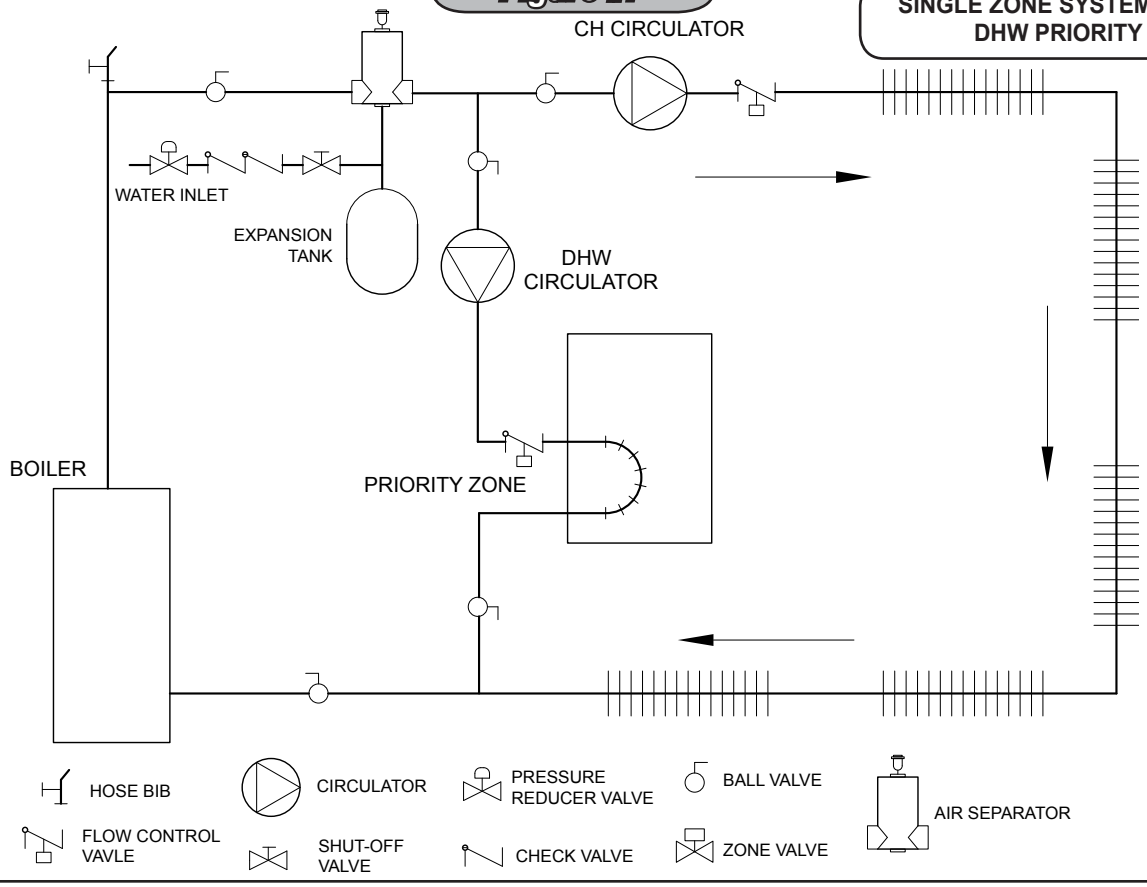


Figure #8

MULTIZONE SYSTEM WITH CIRCULATORS AND DHW PRIORITY

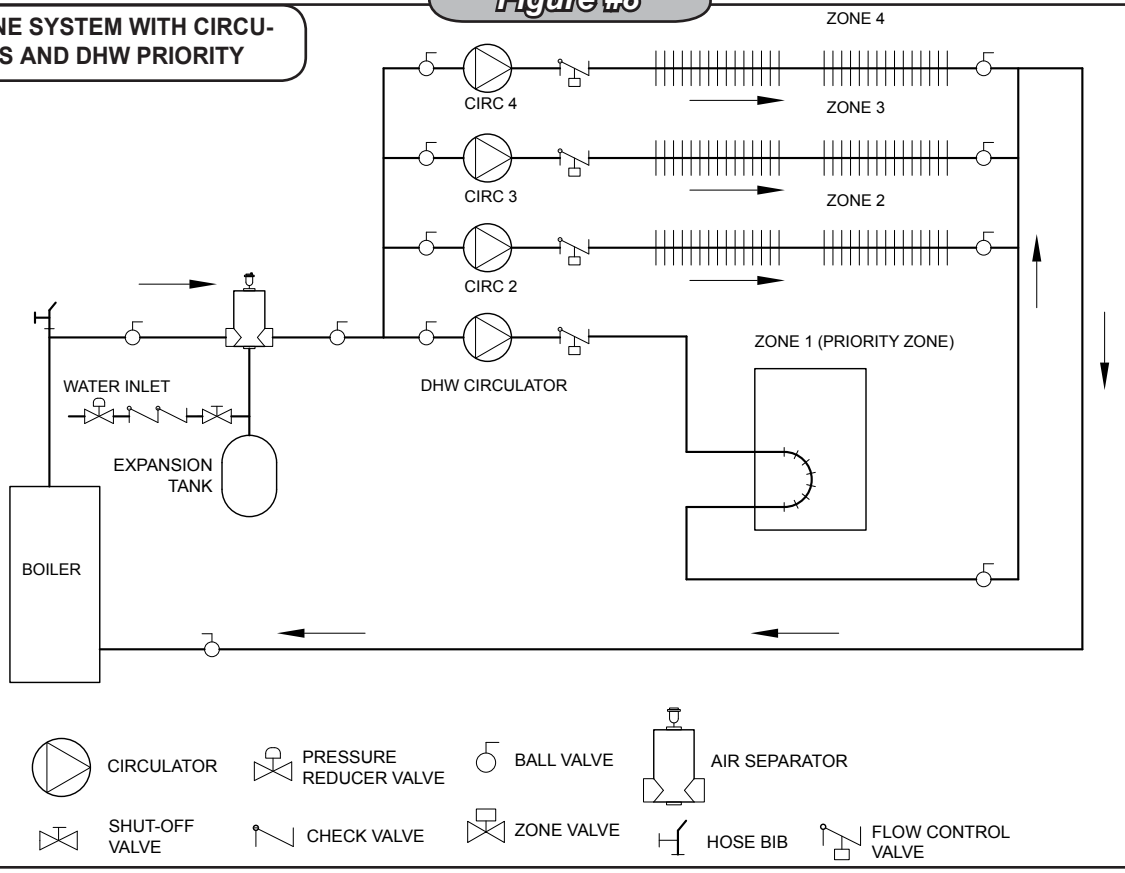


Figure #9

MULTIZONE SYSTEM WITH ZONE VALVES AND DHW PRIORITY (WITH CIRCULATOR)

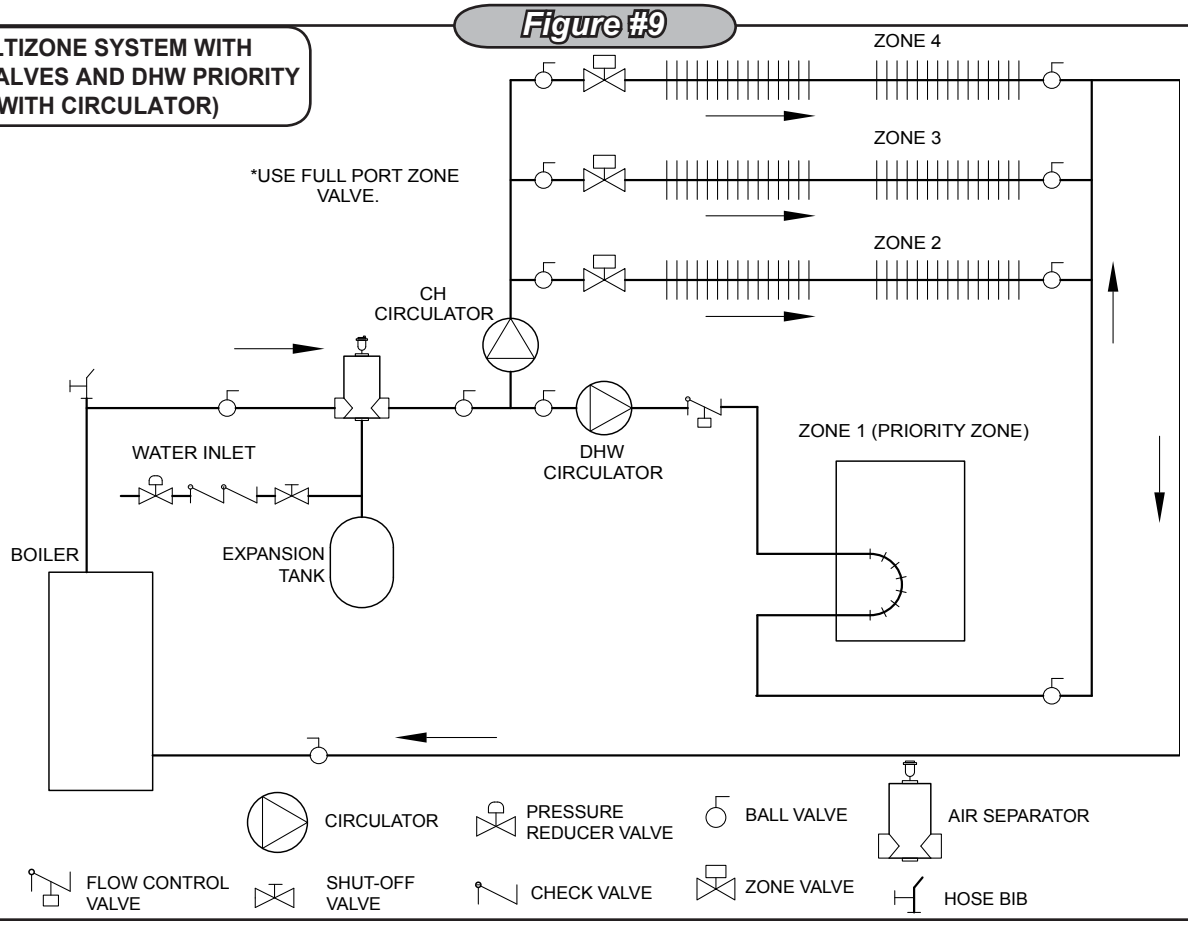
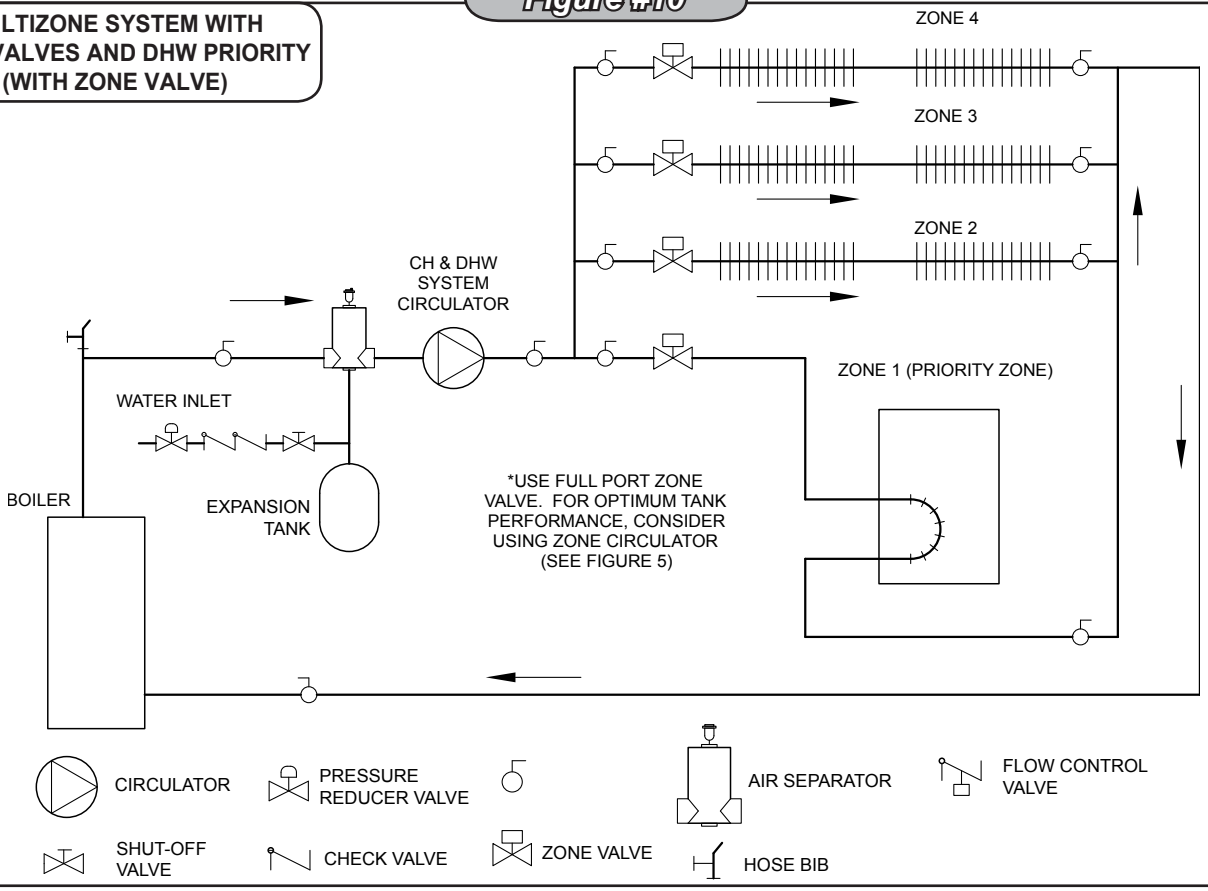


Figure #10

MULTIZONE SYSTEM WITH ZONE VALVES AND DHW PRIORITY (WITH ZONE VALVE)



VENT INSTALLATION

⚠ WARNING

All installations of boilers and venting should be done only by a qualified expert and in accordance with the appropriate manual. Installing or venting a boiler or any other gas appliance with improper methods or materials may result in serious injury or death due to fire or to asphyxiation from poisonous gases such as carbon monoxide with is odorless and invisible.

⚠ WARNING

This boiler shall not be connected to any portion of a mechanical draft system operating under positive pressure.

1. The vent pipe must slope upward from the boiler not less then ¼ inch for every 1 foot to the vent terminal.
2. Horizontal portions of the venting system shall be supported rigidly every 5 feet and at the elbows. No portion of the vent pipe should have any dips or sags.
3. This boiler series is classified as a Category 1 and the vent installation shall be in accordance with latest revision of the National Fuel Gas Code noted above or applicable provisions of the local building codes.
4. Inspect chimney to make certain it is constructed according to NFPA 211. The vent or vent connector shall be Type B or metal pipe having resistance to heat and corrosion not less than that of galvanized sheet steel or aluminum not less than 0.016 inch thick (No. 28 Ga).
5. Connect flue pipe from draft hood to chimney. Bolt or screw joints together to avoid sags. Flue pipe should not extend beyond inside wall of chimney. Do not install manual damper in flue pipe or reduce size of flue outlet except as provided by the latest revision of ANSIZ223.1. Protect combustible ceiling and walls near flue pipe with fireproof insulation. Where two or more appliances vent into a common flue, the area of the common flue must be at least equal to the area of the largest flue plus 50 percent of the area of each additional flue.

VENT SYSTEM MODIFICATION

When an existing boiler is removed from a common venting system, the system is likely to be too large for the proper venting of the appliances still connected to it. If this situation occurs, the following test procedure must be followed:

REMOVAL OF BOILER FROM VENTING SYSTEM

At the time of removal of an existing boiler, the following steps shall be followed with each appliance remaining connected to the common venting system placed in operation, while the other appliances remaining connected to the common venting system are not in operation.

1. Seal an unused opening in the common venting system.
2. Visually inspect the venting system for proper size and horizontal pitch and determine there is no blockage or restriction, leakage, corrosion and other deficiencies which could cause an unsafe condition.
3. Insofar as is practical, close all building doors and windows and all doors between the space in which the appliances remaining connected to the common venting system are located and other spaces of the building. Turn on clothes dryers and any other appliance not connected to the common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.
4. Place in operation the appliance being inspected. Follow the lighting instructions. Adjust thermostat so appliance will operate continuously.
5. Test for spillage at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle, or smoke from a cigarette, cigar or pipe.
6. After it has been determined that each appliance remaining connected to a common venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas burning appliances to their previous condition of use.
7. Any improper operation of the common venting system

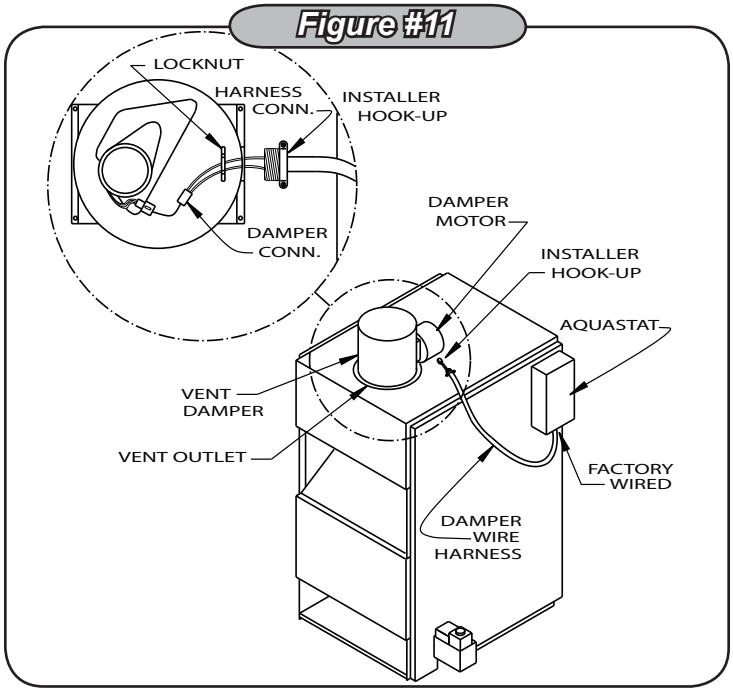
should be corrected so the installation conforms with the latest revision of the National Fuel Gas Code, ANSI Z223.1. When resizing any portion of the common venting system, the common venting system should be resized to approach the minimum size as determined using the appropriate tables in the latest revision of the National Fuel Gas Code, ANSI Z223.

VENT DAMPER INSTALLATION & INSTRUCTIONS

DAMPER INSTALLATION

NOTE: Refer to ***Figure #11*** for steps 1-6.

Figure #11

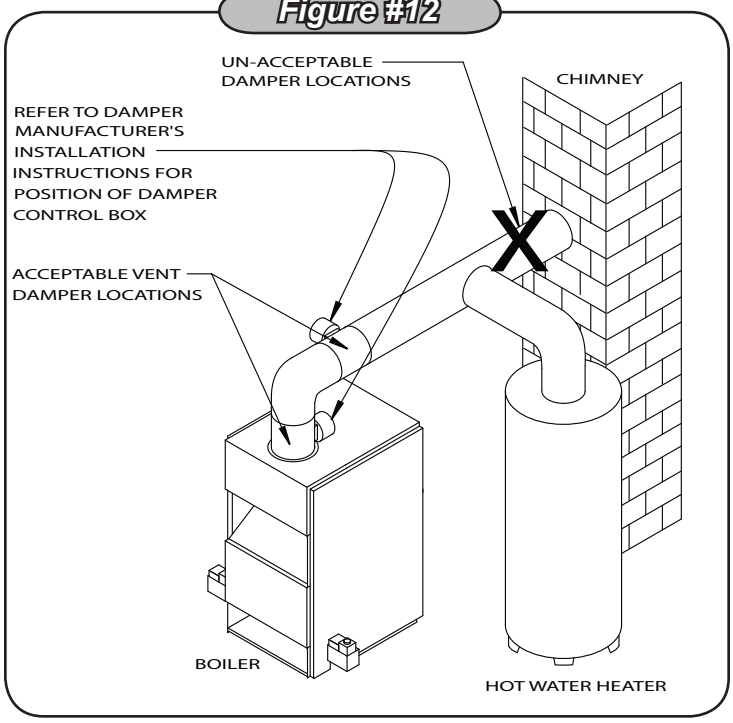


1. Place Vent Damper on or as close to vent outlet of boiler as possible. (Figure #12)
2. Remove Vent Damper Motor cover.
3. Feed damper wire harness connector through bracket hole on Damper Motor frame.
4. Tighten locknut onto Damper wire harness connector.
5. Plug Damper connector into socket on Damper Motor frame.
6. Replace Damper Motor cover and wire Damper in accordance with Figure #11.

DAMPER INSTRUCTIONS

1. Ensure that only the boiler is serviced by the Vent Damper. (Figure #12)

Figure #12

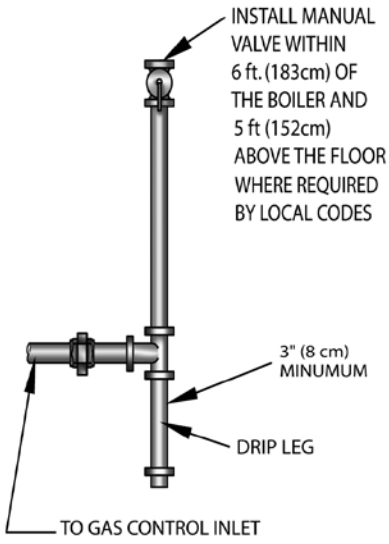

UN-ACCEPTABLE DAMPER LOCATIONS
CHIMNEY
REFER TO DAMPER MANUFACTURER'S INSTALLATION INSTRUCTIONS FOR POSITION OF DAMPER CONTROL BOX
ACCEPTABLE VENT DAMPER LOCATIONS
BOILER
HOT WATER HEATER

2. Clearance of not less than 6 inches between Vent Damper and combustible material must be maintained. Additional clearance should be allowed for service of Vent Damper.
3. Vent Damper must be in the open position when appliance main burners are operating.
4. The Vent Damper position indicator must be in a visible location following installation.
5. The thermostat's heat anticipator must be adjusted to match the total current draw of all controls associated with the boiler during a heating cycle.

CONNECTING GAS SERVICE

1. Connect gas service from meter to control assembly in accordance with ANSI Z223.1 and local codes or utility. A ground joint union should be installed for easy removal of gas control for servicing. A drip leg or trap must be installed at the bottom of a vertical section of piping at the inlet to the boiler. A pipe compound resistant to the action of liquified petroleum gases must be used on all threaded pipe connections. Check with the local utility for location of manual shutoff valve if required. (**Figure #13**)

Figure #13


INSTALL MANUAL VALVE WITHIN 6 ft. (183cm) OF THE BOILER AND 5 ft (152cm) ABOVE THE FLOOR WHERE REQUIRED BY LOCAL CODES
3" (8 cm) MINUMUM
DRIP LEG
TO GAS CONTROL INLET

2. The gas line should be of adequate size to prevent undue pressure drop and never smaller than the pipe size of the main gas control valve. (See Chart)

MAXIMUM CAPACITY OF PIPE IN CUBIC FEET OF GAS/HOUR
(Gas Pressure = 0.5 psig or less, Pressure Drop = 5 in. w/c)

Length of Pipe (Feet)	Nominal Iron Pipe Size			
	½"	¾"	1"	1¼"
10	175	360	680	1400
20	120	250	465	950
30	97	200	375	770
40	82	170	320	660
60	66	138	260	530
80	57	118	220	460
100	50	103	195	400

For additional information refer to the National Fuel Gas Code Handbook.

3. To check for leaks in gas piping, use a soap and water solution or other approved method.

⚠ WARNING

Do not use an open flame!!

4. Disconnect boiler from gas supply piping system during any pressure testing of the gas piping. After reconnecting, leak test gas connection and boiler piping before placing boiler back into operation.

	Natural Gas	Propane
Min. Supply Pressure	5" w.c.	11" w.c.
Max. Supply Pressure	14" w.c.	14" w.c.
Manifold Pressure	3.5" w.c.	10.5" w.c.

ELECTRICAL SECTION

ELECTRICAL WIRING

See wiring diagrams on the following two pages for details.

Electrical wiring must conform with the National Electrical Code, ANSI/NFPA No 70 latest edition when installed in the United states, the CSA C22.1 Canadian Electrical Code, Part 1, when installed in Canada, and/or the local authority having jurisdiction.

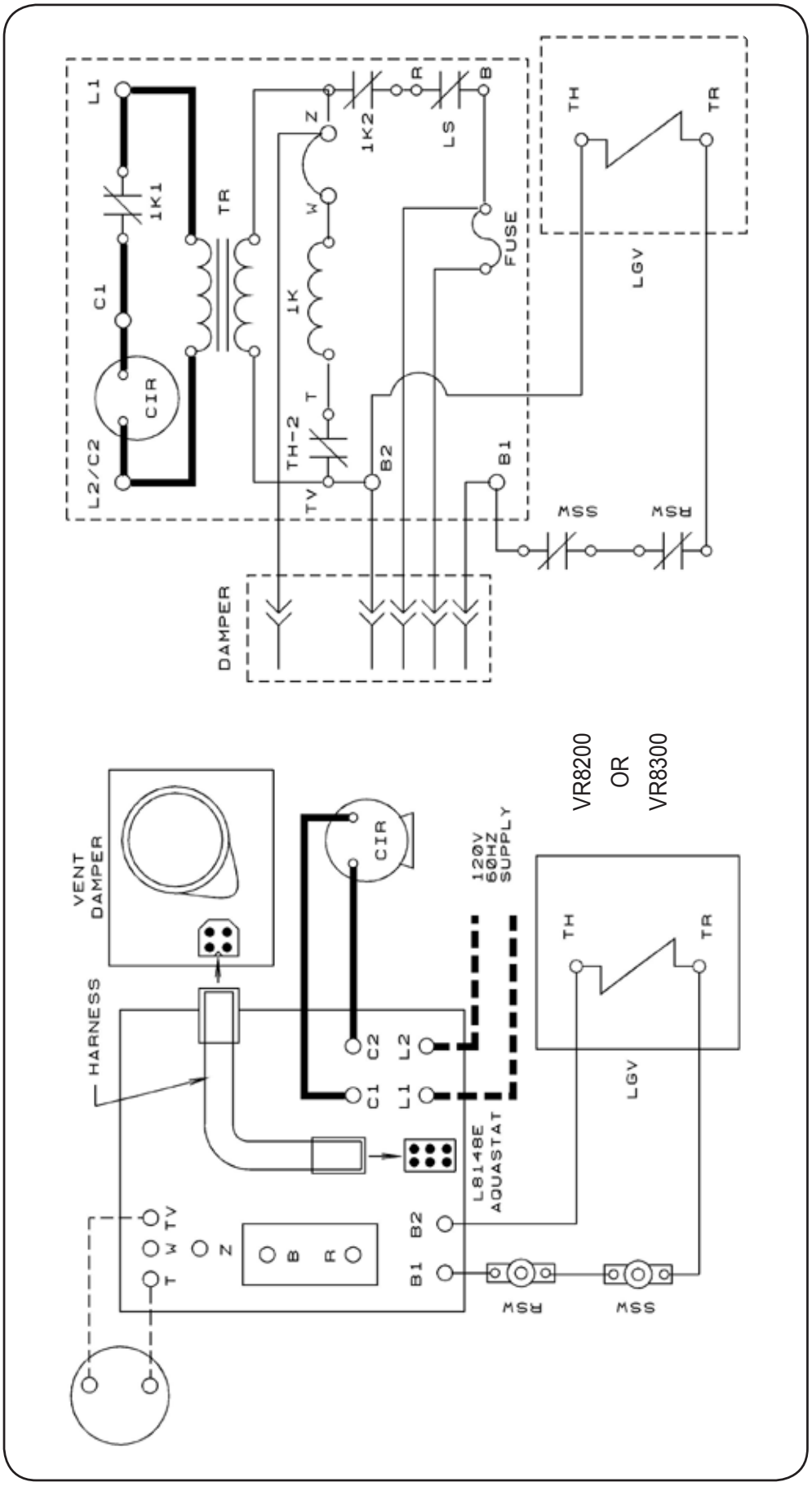
⚠ WARNING

When an external electrical source is utilized, the boiler, when installed, must be electrically grounded in accordance with these requirements.

IMPORTANT: Install a fused disconnect switch between boiler and electric panel at a convenient location.

THERMOSTAT INSTALLATION

1. Thermostat should be installed on an inside wall about four feet above the floor.
2. NEVER install a thermostat on an outside wall.
3. Do not install a thermostat where it will be affected by drafts, hot or cold pipes, sunlight, lighting fixtures, televisions, a fireplace, or a chimney.
4. Check thermostat operation by raising and lowering thermostat setting as required to start and stop the burners.
5. Instructions for the final adjustment of the thermostat are packaged with the thermostat (adjusting heating anticipator, calibration, etc.)


L1
1K1
TR
C1
CIR
L2/C2
1K
W
Z
1K2
R
LS
B
FUSE
T
TH-2
TV
B2
B1
TH
TR
LGV
MSS
RSW
DAMPER
VR8200
OR
VR8300
VENT
DAMPER
HARNESS
120V
60HZ
SUPPLY
C2
L2
C1
L1
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AQUASTAT
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B2
B1
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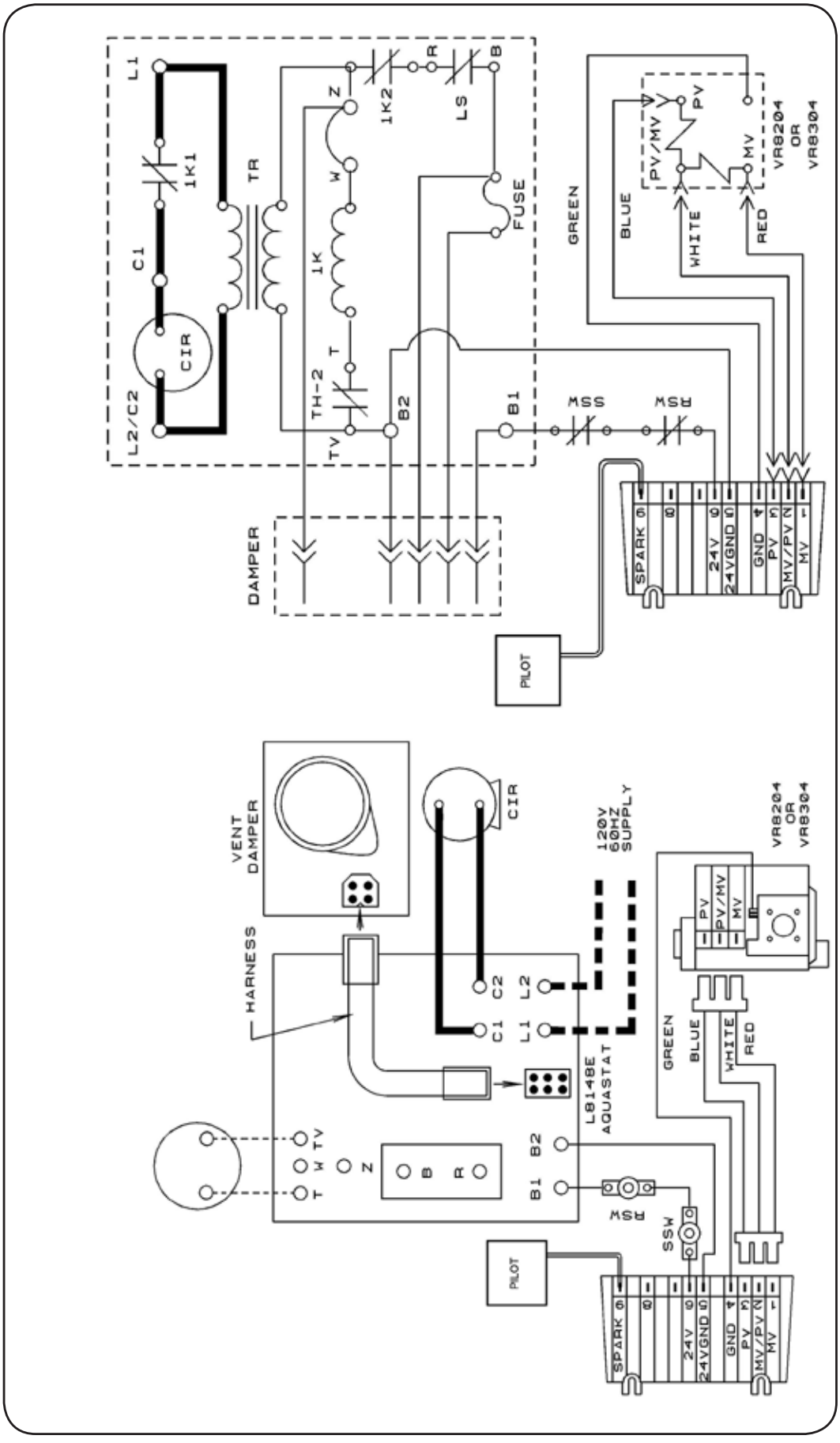
L1
1K1
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C1
CIR
L2/C2
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R
LS
B
W
1K
FUSE
T
TH-2
TV
B2
B1
SSW
RSW
GREEN
BLUE
PV/MV
PV
MV
VR8204
OR
VR8304
WHITE
RED
DAMPER
SPARK
24V
24VGND
GND
PV
MV/PV
MV
PILOT
VENT
DAMPER
CIR
120V
60HZ
SUPPLY
HARNESS
C2
L2
C1
L1
L8148E
AQUASTAT
T
W
TV
Z
B
R
B2
B1
RSW
SSW

⚠ WARNING

IF YOU DO NOT FOLLOW THESE INSTRUCTIONS EXACTLY, A FIRE OR EXPLOSION MAY RESULT, CAUSING PROPERTY DAMAGE, PERSONAL INJURY OR LOSS OF LIFE.

Before any procedures are attempted on this appliance, it is necessary to determine if the ignition system is electric or standing pilot. If you are uncertain, contact the manufacturer before proceeding.

⚠ WARNING

Before lighting any type of pilot burner (standing or intermittent), make certain the hot water boiler and system are full of water to minimum pressure of 12 lbs. per square inch in the system, and also make certain that the system is vented of air. Set the operating control of thermostat to a "below" normal setting. Refer to the following appropriate lighting instruction.

LIGHTING PROCEDURE FOR BOILER WITH INTERMITTENT PILOT SYSTEM

For Your Safety, Read Before Operating!!

1. A. This appliance is equipped with an ignition device which automatically lights the pilot. Do not try to light the appliance by hand.
2. B. Before operating, smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

⚠ CAUTION

WHAT TO DO IF YOU SMELL GAS

- **Do not try to light any appliance.**
- **Do not touch any electrical switches; do not use any phones in your building.**
- **Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.**
- **If you cannot reach your gas supplier, call the fire department.**

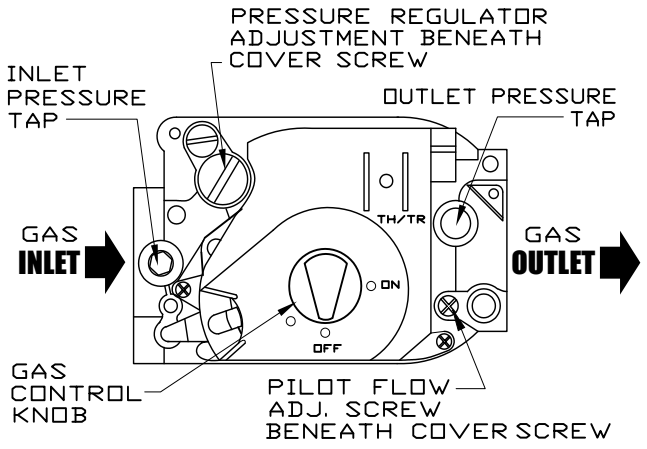
C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it. Call a qualified service technician. Force or attempted repair may result in a fire or explosion.

D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

OPERATING INSTRUCTIONS FOR INTERMITTENT PILOT SYSTEM

1. STOP! Read the safety information in the User's Information Manual.
2. Set the thermostat to lowest setting.
3. Turn off all electric power to the appliance.
4. This appliance is equipped with an ignition device which automatically lights the pilot. Do not try to light the pilot by hand. (Figure #14)

Figure #14



5. Turn gas control knob clockwise ↷ to "OFF."
6. Wait (5) minutes to clear out any gas. If you then smell gas, STOP! Follow "What To Do If You Smell Gas" in the safety information above. If you don't smell gas, go on to the next step.
7. Turn gas control knob counterclockwise ↶ to "ON."
8. Turn on all electric power to the appliance.
9. Set thermostat to desired setting.
10. If the appliance will not operate, follow the instructions "**To Turn Off Gas To Appliance**" and call a qualified service technician or your gas supplier.

LIGHTING PROCEDURE FOR BOILER WITH CONTINUOUS PILOT

For Your Safety, Read Before Lighting!!

1. Read the warning at the beginning of "**Lighting Instructions**."
2. This appliance has a pilot which must be lighted by hand. When lighting the pilot, follow these instructions exactly.
3. Before lighting, smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor. See section "**What To Do If You Smell Gas**."
4. Use only your hand to push in or turn gas control knob or reset button. Never use tools. If the knob or reset button will not push in or turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.
5. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

LIGHTING INSTRUCTIONS FOR CONTINUOUS PILOT

1. **STOP!** Read the safety information at the beginning of these instructions.
2. Set the thermostat to the lowest setting.
3. Turn off all electric power to the appliance.
4. Remove access panel and burner door.
5. Turn gas control knob clockwise to "OFF." ***(Figures #15 and #16)***

Figure #15

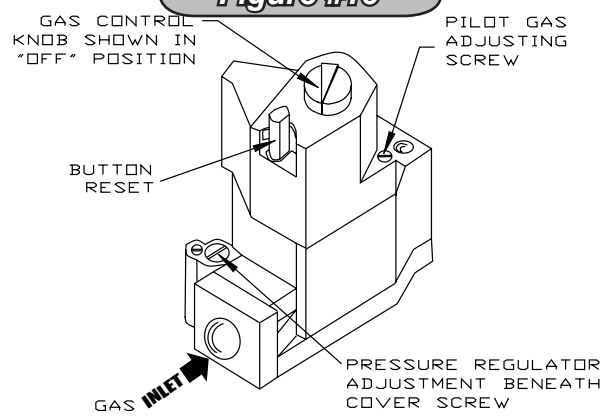
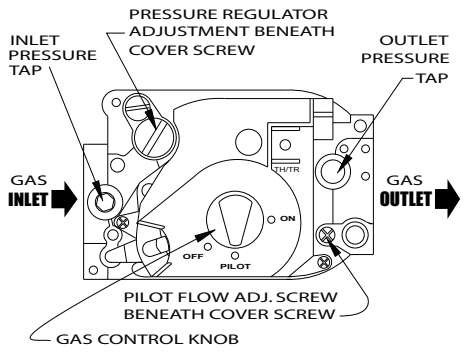

GAS CONTROL KNOB SHOWN IN "OFF" POSITION
PILOT GAS ADJUSTING SCREW
BUTTON RESET
PRESSURE REGULATOR ADJUSTMENT BENEATH COVER SCREW
GAS INLET

Figure #16



NOTE: *Some gas control knobs cannot be turned from "PILOT" to "OFF" unless knob is pushed in slightly.* ***DO NOT FORCE.***

6. Wait (5) minutes to clear out any gas. If you then smell gas, STOP! Follow "**What To Do If You Smell Gas**." If you don't smell gas, go to the next step.
7. Find pilot. Follow metal tube from gas control. Depending on the model of the boiler, pilot is either mounted on the base or on one of the burner tubes.
8. Turn gas control knob counterclockwise to "PILOT."
9. Push in gas control knob or reset button if so equipped, all the way in and hold. Immediately light the pilot with a match. Continue to hold the gas control knob or reset button in for about 1 minute after the pilot is lit. Release knob or button, and it will pop up back up. Pilot should remain lit. If it goes out, repeat steps 5 through 9.
   - If knob or button does not pop up when released, stop and immediately call a qualified service technician or your gas supplier.
   - If the pilot will not stay lit after several tries, turn the gas control knob clockwise to "OFF." Call a qualified service technician or your gas supplier.
10. Replace burner door.
11. Turn gas control knob counterclockwise to "ON."
12. Replace access panel.
13. Turn on all electric power to the appliance.
14. Set thermostat to desired setting.

TO TURN OFF GAS TO THE APPLIANCE

1. Set the thermostat to lowest setting.
2. 2. Turn off all electric power to the appliance if service is to be performed.
3. 3. Push in gas control knob slightly and turn clockwise to "OFF." DO NOT FORCE.
4. 4. Call a qualified service technician.

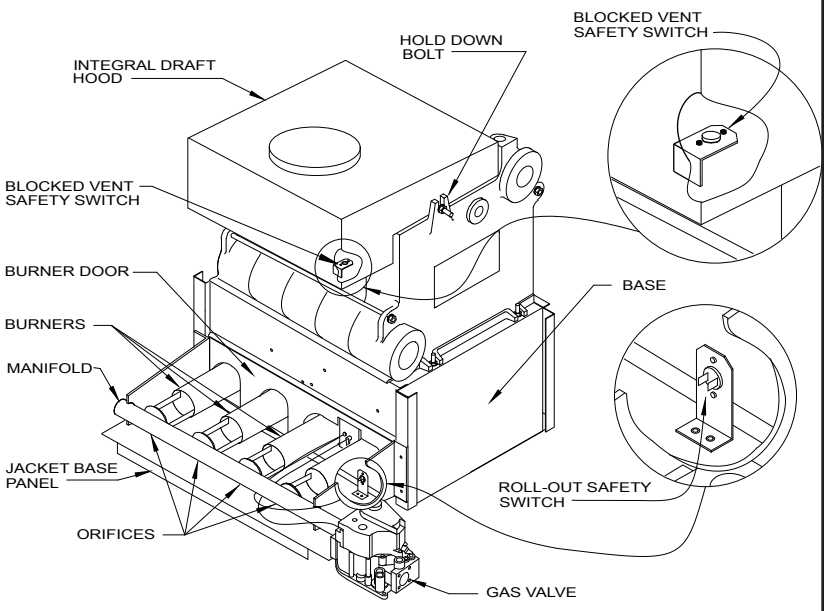
NORMAL SEQUENCE OF OPERATION

On a call for heat, the thermostat will actuate, completing the circuit to the control. The completed circuit to the control will first activate the circulator and damper which will close an end switch inside the damper. This action will complete the circuit to the ignition system and ignition will take place.

In the event the boiler water temperature exceeds the high limit setting on the boiler mounted high limit control, power will be interrupted between the control system and the ignition system. The power will remain off until the boiler water temperature drops below the high limit setting. The circulator will continue to operate under this condition until the thermostat is satisfied.

In the event the flow of combustion products through the boiler venting system becomes blocked, the blocked vent safety switch will shut the main burner gas off. Similarly, if the boiler flueway becomes blocked, a flame rollout safety switch will shut the main burner gas off. ***(Figure #17)*** If either of these conditions occur, **DO NOT ATTEMPT TO PLACE THE BOILER BACK INTO OPERATION. CONTACT A CERTIFIED SERVICE AGENCY.**

Figure #17



GENERAL INSTRUCTIONS

Before seasonal start-up, have a certified service agency check the boiler for soot and scale in the flues, clean the burners and check the gas input rate to maintain high operating efficiency.

⚠ CAUTION

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation.

Verify proper operation after service.

The service agency or owner should make certain the system is filled with water to minimum pressure and open air vents, if used, to expel any air that may have accumulated in the system. Check the entire piping system and, if any leaks appear, have them repaired.

Circulators need to be checked and maintained. Refer to the circulator manufacturer's instructions.

The venting system should be inspected at the start of each heating season. Check the vent pipe from the boiler to the chimney for signs of deterioration by rust or sagging joints. Repair if necessary. Remove the vent pipe at the base of the chimney or flue and using a mirror, check vent for obstruction and make certain the vent is in good working order.

The boiler flue gas passageways may be inspected by a light and mirror. Remove the burner door. (**Figure #20**) Place a trouble lamp in the flue collector through the draft relief opening. With the mirror positioned above the burners, the flue gas passageways can be checked for soot or scale.

The following procedure should be followed to clean the flue gas passageways:

1. Remove the burners from the combustion chamber by raising the burners up from the manifold orifices and pulling toward the front of the boiler. (**Figure #20**)
2. Disconnect the vent pipe from the draft hood.
3. Remove the top jacket panel.
4. Remove the combination flue collector and draft hood from the boiler castings by loosening the nuts on the hold down bolts located on each side of the collector. (**Figure #17**)
5. Place a sheet of heavy paper or similar material over the bottom of the base and brush down the flue passageways. The soot and scale will collect on the paper and is easily removed with the paper.

6. With the paper still in place in the base, clean the top of the boiler castings of the boiler putty or silicone used to seal between the castings and flue collector. Make certain that chips are not lodged in the flue passageways.

When the cleaning process is complete, restore the boiler components to their original position. Use IS-808 GE silicone (available from a distributor) to seal around the flue collector and boiler castings.

A visual check of the main burner and pilot flames should be made at the start of the heating season and again in mid-season. The main burner flame should have a well defined inner blue mantel with a lighter blue outer mantel. Check the burner throats and burner orifices for lint or dust obstruction. (**Figures #19 and #20**)

Figure #19

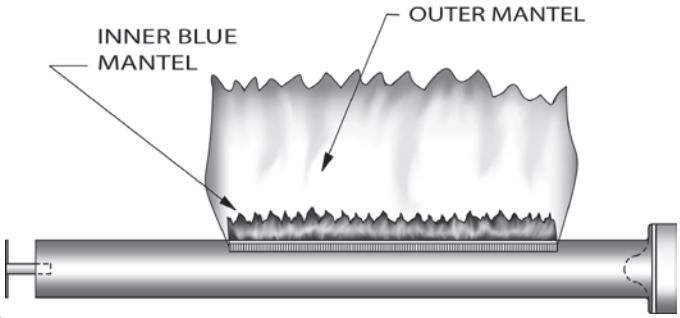
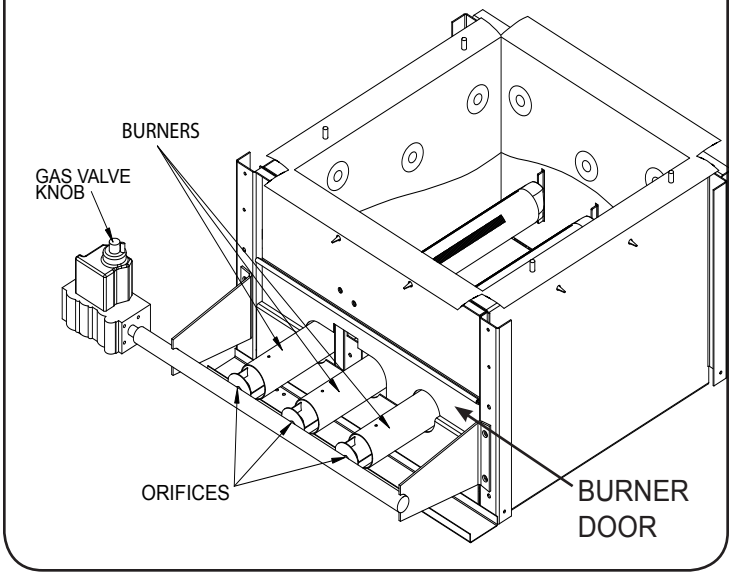
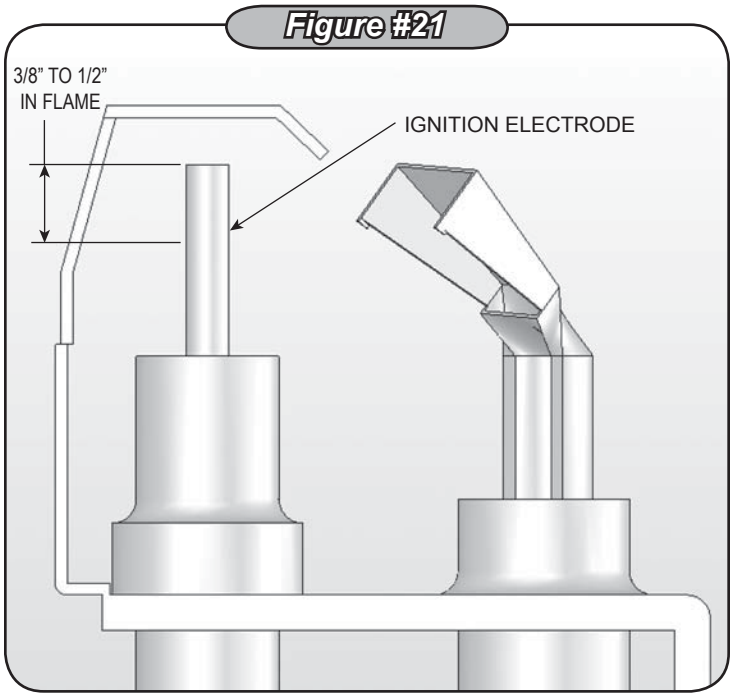


Figure #20



The pilot flame should envelop ⅜ to ½ inch of the tip of the pilot thermocouple, ignition/sensing electrode or mercury sensor. (**Figure #21**)

Figure #21



To adjust the pilot flame, remove the pilot adjustment cover screw (Figures #14 - #16 on previous pages) and turn the inner adjustment screw counterclockwise to increase or clockwise to decrease pilot flame. Be sure to replace cover screw after adjustment to prevent possible gas leakage.

The burners and pilot should be checked for signs of corrosion, rust or scale buildup. The area around the boiler must be kept clear and free of combustible materials, gasoline and other flammable vapors and liquids.

The free flow of combustion and ventilating air to the boiler and boiler room must not be restricted or blocked.

It is recommended that a qualified service agency be employed to make an annual inspection of the boiler and heating system. They are experienced in making the inspections outlined above, and, in the event repairs or corrections are necessary, trained technicians can make the proper changes for safe operation of the boiler.

Gas input to the boiler can be adjusted by removing the protective cap on the pressure regulator **(Figures #14-#16)** and turning the screw clockwise to increase input and counterclockwise to decrease input. The manifold pressures are taken at the outlet side of the gas valve. *(***Figure #15 and #16***)* To check for proper flow of natural gas to the boiler, divide the input rate shown on the rating plate by the heating value of the gas obtained from the local gas company. This will determine the number of cubic feet of gas required per hour. With all other gas appliances off, determine the flow of gas through the meter for two minutes and multiply by 30 to get the hourly rate. Make minor adjustments to the gas input as described above.

Burner orifices should be changed if the final manifold pressure varies more than plus or minus 0.3 inches water column from the specified pressure.

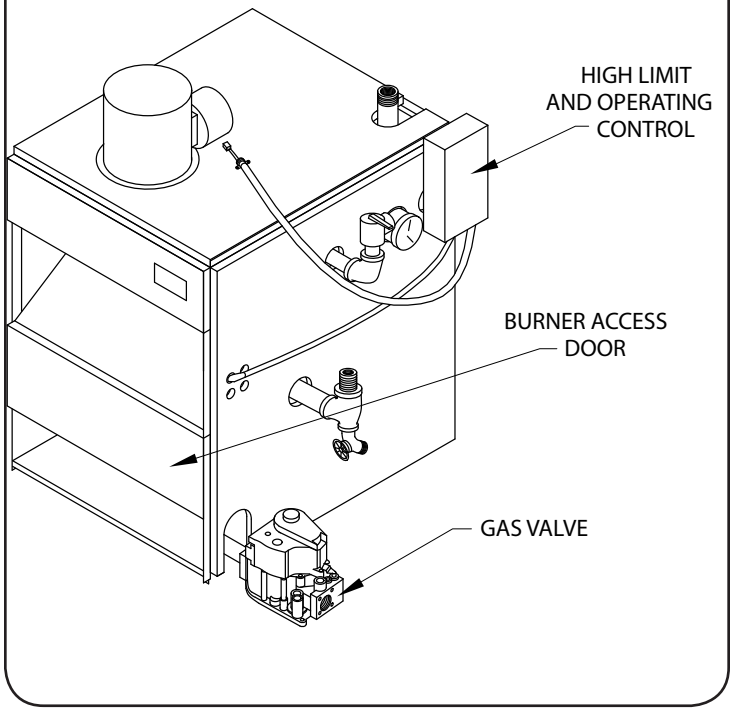
Primary air adjustment is not necessary, therefore air shutters are not furnished as standard equipment. Air shutters can be furnished on request where required by local codes or conditions.

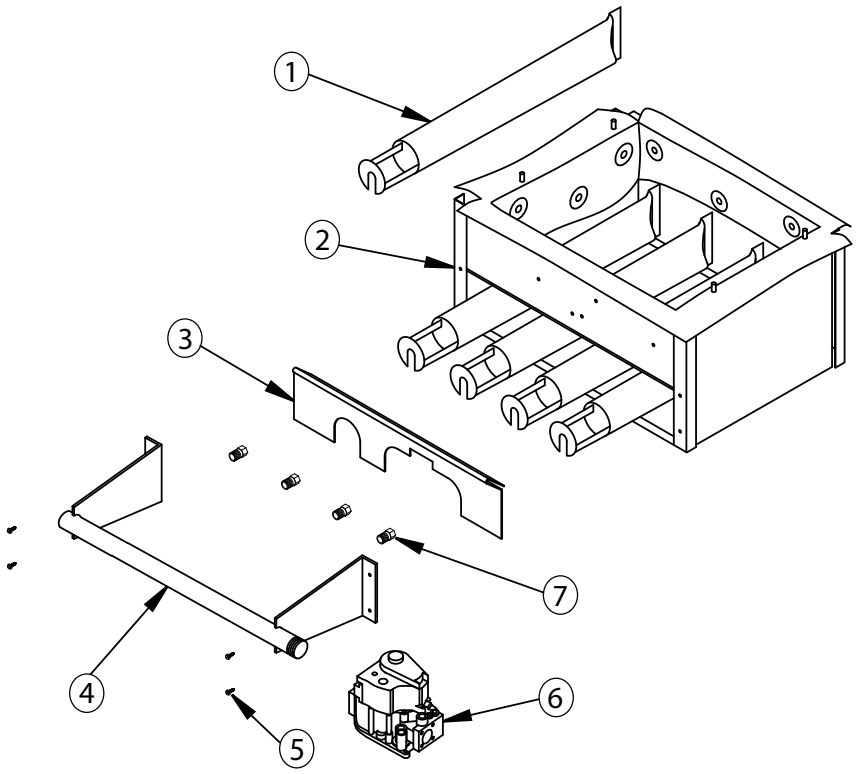
CHECK SAFETY CONTROL CIRCUIT after burner adjustments are made for satisfactory operation.

1. **Pilot:** With main burner operating, turn the pilot gas adjusting screw clockwise until pilot gas is turned off. *(**Figures #14-#16** on previous pages)* Within 90 seconds the main gas control should close, shutting off the gas to the main burner.

2. **High Limit Control** *(**Figure #22**)*: Remove cover and note temperature setting. Decrease this setting to minimum and operate boiler. When the boiler water temperature exceeds the control temperature setting, the control will open the circuit, closing the automatic main gas valve.

Figure #22

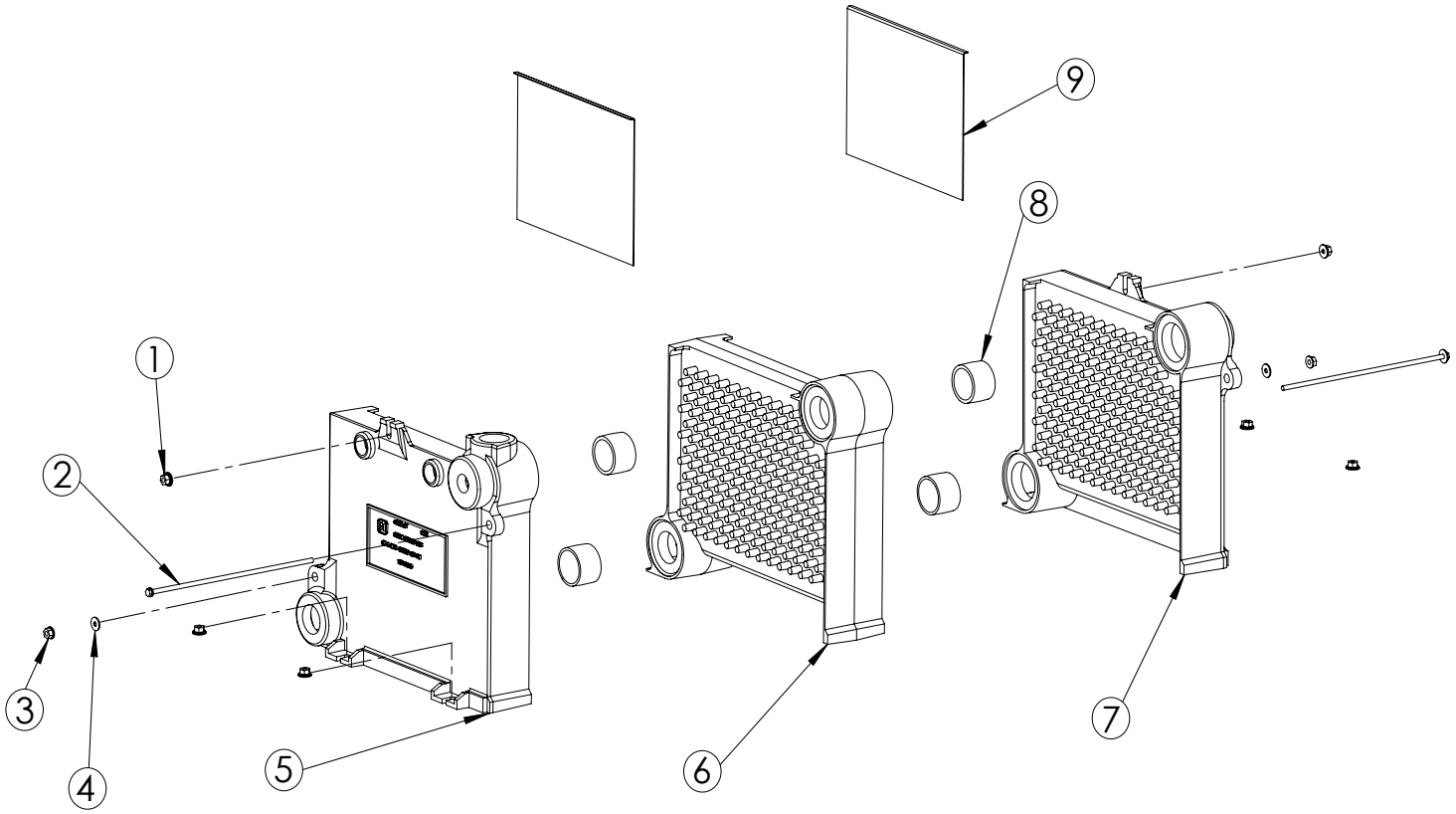




Item #	Description	Part #	Qty.
1	BURNER TUBE 1 1/2" - 50	240005543	1
	BURNER TUBE 1 1/2" - 75, 100		2
	BURNER TUBE 1 1/2" - 125, 150		3
	BURNER TUBE 1 1/2" - 175, 200		4
	BURNER TUBE 1 1/2" - 250		5
	BURNER TUBE 1 1/2" - 300		6
2	BASE W/INSUL - 50	5611601	1
	BASE W/INSUL - 75, 100	5611602	
	BASE W/INSUL - 125, 150	5611603	
	BASE W/INSUL - 175, 200	5611604	
	BASE W/INSUL - 250	5611605	
	BASE W/INSUL - 300	5611606	
3	BURNER DOOR - 50	3261201	1
	BURNER DOOR - 75, 100	3262701	
	BURNER DOOR - 125, 150	3262801	
	BURNER DOOR - 175, 200	32621001	
	BURNER DOOR - 250	32621002	
	BURNER DOOR - 300	32621003	
4	MANIFOLD - 50	356-2-1.01	1
	MANIFOLD - 75&100	356-2-1.02	
	MANIFOLD - 125&150	356-2-1.03	
	MANIFOLD - 175&200	356-2-1.04	
	MANIFOLD - 250	356-2-1.05	
	MANIFOLD - 300	356-2-1.06	

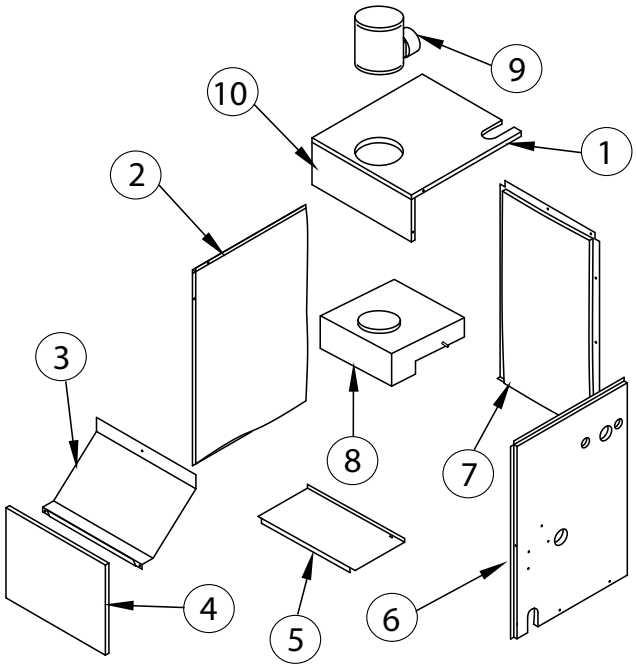
Item #	Description	Part #	Qty.
5	SCREW ¼ - 20 X ½ SELF TAP	HW-005.01	4
6	GAS VALVE VR8200H - 50 - 150 24V NAT	VG-003.05	1
	GAS VALVE VR8200H - 50 - 300 24V LP	VG00307	
	GAS VALVE VR8204H - 50 - 150 SPARK NAT	VG01101	
	GAS VALVE VR8304H4 - 175-300 SPARK NAT	VG01103	
	GAS VALVE VR8304 - 50-300 SPARK LP	VG01104	
	GAS VALVE VR8300H4 - 250 & 300 24V NAT	VG01201	
	GAS VALVE VR8300H4 - 175 & 200 24V NAT	VG01202	
7	ORIFICE 3.2mm NAT - 50, 100, 150, 200, 250, & 300	240007406	*
	ORIFICE 3.0mm NAT - 175	240007404	
	ORIFICE 2.9mm NAT - 125	240007403	
	ORIFICE 2.8mm NAT - 75	240007402	
	ORIFICE #47 LP - 50, 100, 150, 200, 250, & 300	355-1-5.04	
	ORIFICE #49 LP - 125&175	355-1-5.06	
	ORIFICE #50 LP - 75	355-1-5.07	
NOT SHOWN	COMBUSTIBLE BASE FLOORING - 50	325-2-8.01	1
	COMBUSTIBLE BASE FLOORING - 75, 100	325-2-8.02	
	COMBUSTIBLE BASE FLOORING - 125, 150	325-2-8.03	
	COMBUSTIBLE BASE FLOORING - 175, 200	325-2-8.04	
	COMBUSTIBLE BASE FLOORING - 250	325-2-8.05	
	COMBUSTIBLE BASE FLOORING - 300	325-2-8.06	

* Orifice Quantities: Model 50 - qty 1; Model 75 & 100- qty 2; Model 125 & 150- qty 3; Model 175 & 200- qty 4; Model 250- qty 5; Model 300- qty 6.



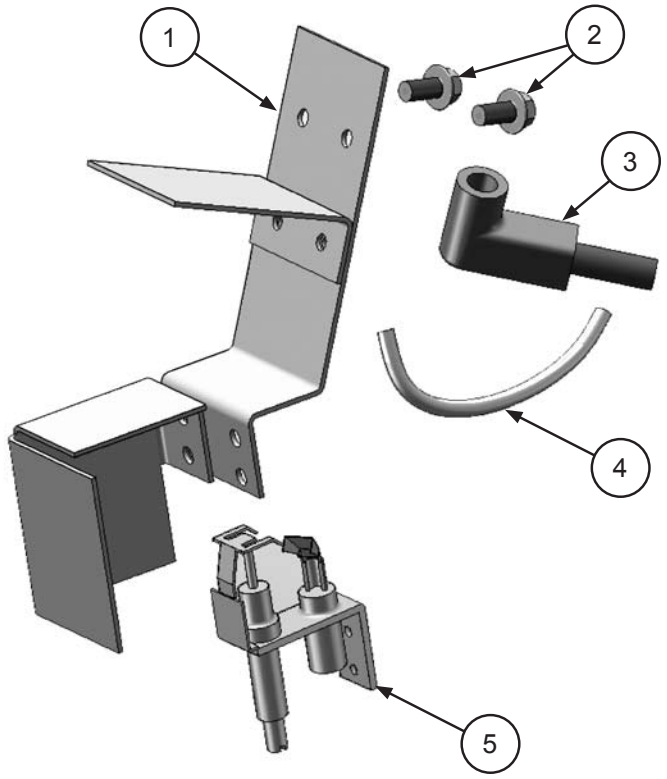
Item	Part No.	Description	Qty.
1	HW06901	Nut 5/16 - 18 Wislock	6
2	14605001	Tie Rod - ¼" x 7¼" (045)	2
	HW-011.01	Tie Rod - ¼" x 11½" (070, 096)	
	HW-011.03	Tie Rod - ¼" x 15½" (120, 145)	
	HW-011.05	Tie Rod - ¼" x 19½" (175, 195)	
	HW-011.07	Tie Rod - ¼" x 23" (245)	
	HW-011.09	Tie Rod - ¼" x 27" (295)	
3	HW-003.02	Nut ¼"-20 Hex	2
4	HW-008.01	Washer - 5/16" Flat	4
5	100-2-3.01	Right Hand Section	1
6	100-2-1.01	Center Section (075, 100)	1
		Center Section (125, 150)	2
		Center Section (175, 200)	3
		Center Section (250)	4
		Center Section (300)	6

Item	Part No.	Description	Qty.
7	100-2-2.01	Left Hand Section	1
8	43300976	Push Nipple 2" Mach. (050)	2
		Push Nipple 2" Mach. (075, 100)	4
		Push Nipple 2" Mach. (125, 150)	6
		Push Nipple 2" Mach. (175, 200)	8
		Push Nipple 2" Mach. (250)	10
		Push Nipple 2" Mach. (300)	12
9	3461601	Baffle (075 & 175 Only)	2
Fully Assembled Heat Exchangers			
100-2-7.01		Heat Exchanger (3 Section)	
100-2-7.02		Heat Exchanger (4 Section)	
100-2-7.03		Heat Exchanger (5 Section)	
100-2-7.04		Heat Exchanger (6 Section)	
100-2-7.05		Heat Exchanger (7 Section)	
100-2-7.06		Heat Exchanger (2 Section)	



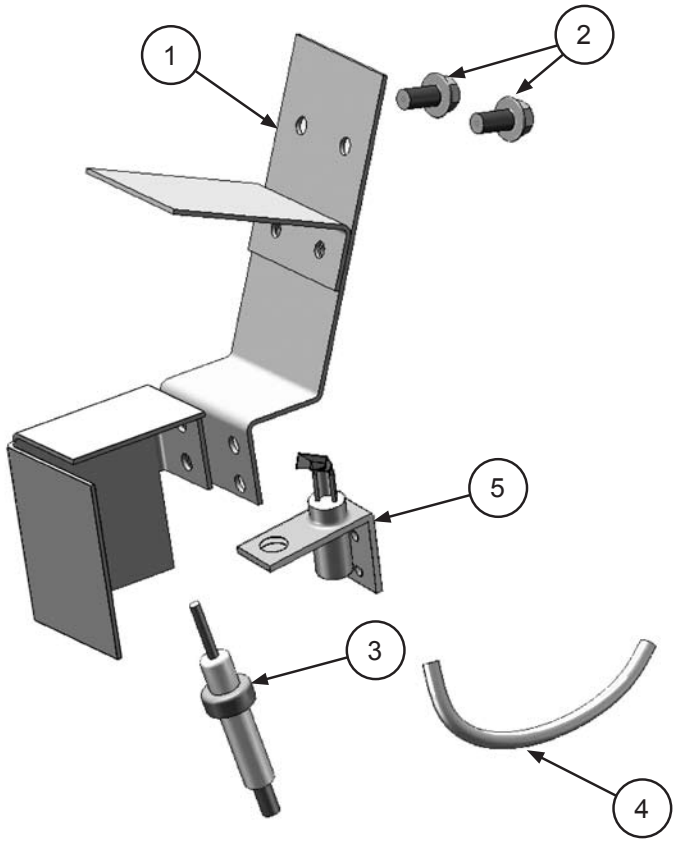
Item #	DESCRIPTION	Part Number	Qty.
1	PANEL - TOP 50	31621501	1
	PANEL - TOP 75 & 100	31621502	
	PANEL - TOP 125	31621503	
	PANEL - TOP 150	31621504	
	PANEL - TOP 175 & 200	31621505	
	PANEL - TOP & 250	31621506	
	PANEL - TOP & 300	31621507	
2	PANEL - LEFT 250-300	3162704	1
	PANEL - LEFT (L)50-200	3162706	
	PANEL - LEFT (L)250-300	3162707	
	PANEL - LEFT 50-200	3162708	
3	DRAFT DEFLECTOR 50	3162501	1
	DRAFT DEFLECTOR 75/100	3162502	
	DRAFT DEFLECTOR 125/150	3162503	
	DRAFT DEFLECTOR 175/200	3162504	
	DRAFT DEFLECTOR 250	3162505	
	DRAFT DEFLECTOR 300	3162506	
4	PNL LWR ACCES 50	3161101	1
	PNL LWR ACCES 75/100	3161102	
	PNL LWR ACCES 125/150	3161103	
	PNL LWR ACCES 175/200	3161104	
	PNL LWR ACCES 225/250	3161105	
	PNL LWR ACCES 275/300	3161106	
5	PANEL - BASE 50	3161201	1
	PANEL - BASE 75 & 100	3161202	
	PANEL - BASE 125 & 150	3161203	
	PANEL - BASE 175 & 200	3161204	
	PANEL - BASE 250	3161205	
	PANEL - BASE 300	3161206	

Item #	DESCRIPTION	Part Number	Qty.
6	PANEL - RIGHT 50-200	3162705	1
	PANEL - RIGHT 225-300	3162703	
7	PANEL - REAR 50	3162601	1
	PANEL - REAR 75 & 100	3162602	
	PANEL - REAR 125 & 150	3162603	
	PANEL - REAR 175 & 200	3162604	
	PANEL - REAR 250	3162605	
	PANEL - REAR 300	3162606	
8	FLUE COL 50	3462101	1
	FLUE COL 100	3462102	
	FLUE COL 150	3462103	
	FLUE COL 200	3462104	
	FLUE COL 250	3462105	
	FLUE COL 300	3462106	
	FLUE COL 125	3462107	
	FLUE COL 75	3462108	
	FLUE COL 175	3462109	
9	DAMPER 4" 50	240006936	1
	DAMPER 5" 75	240006937	
	DAMPER 6" 100 & 125	240006938	
	DAMPER 7" 150 & 175	240006939	
	DAMPER 8" 200 & 250	240006940	
	DAMPER 9" 300	240006941	
10	PNL- UPPER ACCESS 50	31621201	1
	PNL- UPPER ACCESS 75&100	31621202	
	PNL- UPPER ACCESS 125	31621203	
	PNL- UPPER ACCESS 150	31621204	
	PNL- UPPER ACCESS 175 & 200	31621205	
	PNL- UPPER ACCESS 225 & 250	31621206	
	PNL- UPPER ACCESS 275 & 300	31621207	



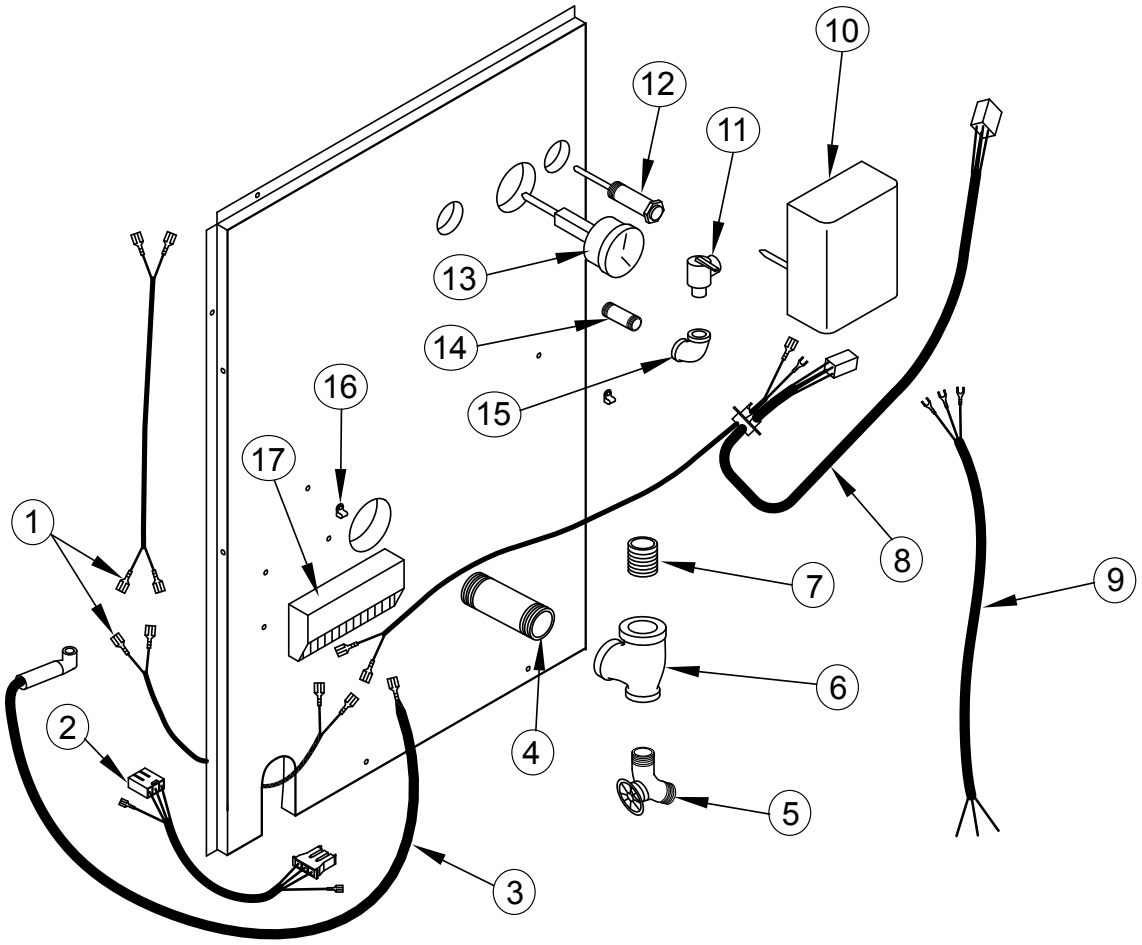
SPARK PILOT			
Item	**Part No.**	**Description**	**Qty.**
1	109007296	PILOT BRACKET ASSEMBLY	1
2	HW-005.01	BRACKET SCREW	2
3	240007093	SPARK CABLE	1
4	14615005	PILOT TUBING, 1/8" x 24"	1
5	PB-001.02	Natural Gas Q345A PILOT	1
	240007096	LP Q345A Pilot	

** Included with #3 - Pilot Tube Assembly Kit (above)*



CONTINUOUS PILOT			
Item	**Part No.**	**Description**	**Qty.**
1	109007296	PILOT BRACKET ASSEMBLY	1
2	HW-005.01	BRACKET SCREW	2
3	1520001	THERMOCOUPLE Q309	1
4	14615005	PILOT TUBING, 1/8" x 24"	1
5	14662098	Natural Gas Q314A PILOT	1
	240007285	LP Q314A Pilot	

** Included with #3 - Pilot Tube Assembly Kit (above)*



ITEM	DESCRIPTION	P/N	QTY.
1	WIRE ROLLOUT/SPILL 28"	37513301	2
2	HARNESS IGN TO G/V 18"	37413602	1
3	PILOT IGNITION CABLE 30"	PB00702	1
4	PIPE - NPL 1.1/4X4.1/2 NPT	PF-006.07	1
5	DRAIN - SHORT	HW-016.03	1
6	PIPE - TEE 1.1/4X3/4X1.1/4	PF-008.03	1
7	PIPE - 1.1/4" CLOSE NPL	PF-006.01	1
8	WIRE LOW VOLTAGE/DAMPER	375-1-14.01	1
9	HARNESS CIRCULATOR 72"	37519501	1
10	CONTROL L8148E1257 (AQUASTAT)	1010002	1
11	RELIEF VALVE 30#	VR-001.01	1
12	WELL 3/4"X3"	AQ-020.01	1
13	GAUGE - THERALTIMETER	GA-001.00	1
14	PIPE - NPL 3/4"X4"	PF-005.11	1
15	PIPE - ELBOW 3/4" 90°	PF-002.04	1
16	CLAMP #3600 WHITE	EF03601	2
17	PLT SPARK CTRL S8600	PB00604	1

Item #	Description	Part #	Qty.
1	TEMP. SENSOR BRACKET	3262001	1
2	CONTROL-FIXED TEMPERATURE THERMO (ROLLOUT SWITCH)	AQ02101	1
3	SCREW - #6 X ¼ HEX HD	HW06501	2

The rollout switch is located on the base and flue collector.
NOTE: The quantities above are for each switch.